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Water Quality Criteria Data Book
Volume I
Organic Chemical Pollution of Freshwater

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27 Abstract

Four hundred ninety six organic chemicals have been reported to be found or are suspected to be in fresh water. Of these, sixty six have been identified. As might be expected, evidence which directly relates the presence of organic chemicals in fresh water with human health is generally lacking.

Industrial sources were responsible for the largest number and variety of structural types of organic chemical pollutants. Reported agricultural sources of pollutants were all pesticides and domestic sources were all detergents. Animal toxicity consisted mainly of acute toxicity data. Pesticides were shown to be the most acutely toxic organic chemicals in water and only methyl mercuric chloride was found to be more toxic. Although the information on chronic threshold doses was insufficient for meaningful interpretation, the organometallics ranked high in chronic toxicity effects.

Of one hundred twenty compounds examined for carcinogenicity in animals, 22.5 percent were positive. Of thirty two compounds examined for teratogenicity in animals, 62.5 percent were positive. Although there is no proven chemical mutagen for man, all showed some effects on genetic material.

Factual information upon which quality criteria of water can be rationally based is generally lacking. (See also W72-08158) (EPA abstract)

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ORGANIC CHEMICAL POLLUTION OF FRESHWATER

for the

ENVIRONMENTAL PROTECTION AGENCY
Water Quality Office

prepared by

ARTHUR D. LITTLE, INC.
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FOREWORD

The quantity of literature since the publication of WATER QUALITY CRITERIA, McKee and Wolfe, Second Edition, 1963, has been so great that rather than a revision, the Environmental Protection Agency is publishing, as its successor, a series of volumes under the general title, WATER QUALTTY CRITERIA DATA BOOK. This series is the Environmental Protection Agency's response to California State Water Resources Control Board Resolution, No. 69-1 titled, "Requesting the Federal Water Pollution Control Administration to Assume Responsibility for Conducting Further Work on the Publication Titled 'Water Quality Criteria'." The Federal Water Quality Administration was asked to give reconsideration to assuming the responsibility for the continuance of summarizing and referencing worldwide literature on water quality criteria.

Volume I, "Organic Pollution of Freshwater," is the first in the series. Volume II, "Inorganic Chemical Pollution," is scheduled for publication late 1971; Volume III, "Effects of Industrial Chemicals on Aquatic Life," early summer 1971; Volume IV, "Recreational Water Quality Criteria," early autumn 1971.

Subsequent volumes will be announced at a later date.

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I. SUMMARY

A survey of the available literature on organic chemical pollution of fresh water showed that 496 organic chemicals have been reported to be found or are suspected to be in fresh water. Of these, 66 have been identified. The informational and scientific quality of the literature are not of a high order. As might be expected, evidence which directly relates the presence of organic chemicals in fresh water with human health is generally lacking.

Industrial sources were responsible for the largest number and variety of structural types of organic chemical pollutants. Reported agricultural sources of pollutants were all pesticides and domestic sources were all detergents. Animal toxicity information was available on all compounds in one form or another, but consisted mainly of acute toxicity data. Most of the limited chronic animal toxicity information pertinent to the problem of organic chemical pollution of fresh water and human health came from Russian sources. These results were used directly by the Russian investigators as quality criteria for humans. Pesticides were shown to be the most acutely toxic organic chemicals in water and only methyl mercuric chloride was found to be more toxic. Although the information on chronic threshold doses was insufficient for meaningful interpretation, the organometallics ranked high in chronic toxicity effects.

Of 120 compounds examined for carcinogenicity in animals, 22.5 percent were positive. Of 32 compounds examined for teratogenicity in animals, 62.5 percent were positive. It would appear that methyl mercuric chloride has been found to be teratogenic in man. Although there is no proven chemical mutagen for man, of 29 compounds examined for mutagenicity, mostly in plant cell systems, all showed some effects on genetic material. High concentrations of certain compounds (mostly pesticides) were shown to be present in the tissues of animals and man. Some of these have been reported to be potential carcinogens, teratogens or mutagens. The available data on pesticides are predominantly American and on non-pesticide compounds predominantly Russian.

This survey has shown that factual information upon which quality criteria of water can be rationally based, is generally lacking for compounds occurring in fresh water. This is further complicated by the threshold and no-threshold controversy in terms of potential carcinogenicity and mutagenicity and to a lesser extent of teratogenicity. The practical proximate solution will presumably have to resemble that employed in the radiation area where some baseline human exposure is unavoidable.

II. INTRODUCTION

Population growth, increasing demands by this population, new technology, and a burgeoning industry all contribute to the overall increase in chemical pollution of fresh water and its potential effects as a health hazard.

The average individual ingests 1 liter of water per day in one form or another in order to maintain body water requirements in the face of what has to be excreted for removal of the wastes of metabolism. This daily intake goes on throughout life and the maintenance of body water is so important that a loss equivalent to more than 5% of body weight at any one time seriously affects normal function.

Some, if not most, of the chemicals we ingest with water on a daily basis can produce acute and/or long-term adverse effects on health. In the past we have learned how to detect and in large measure to control the contamination of water by pathogens. Just as clear water can contain bacteria, so also can clear water contain a host of chemical substances, many of which are unidentified, which may be deleterious to health. Just as new knowledge was needed in the past to identify and control contamination from microorganisms, so is new technology now needed to identify and control chemicals in water.

At one time chemical wastes were in quantities which could be dispersed efficiently in water. This situation no longer exists as witnessed by the frank polluted condition of many of our rivers and lakes. This condition will undoubtedly get worse unless something is done about it. Ideally, nothing should be put in water, but this is unrealistic. The present techniques of haphazard dumping of wastes into the nearest watercourse is producing damaging effects when the wastes reach proportions which cannot be handled by the watercourse. The problem is further compounded by sanitary landfill operations, presently the only means of disposal of trash in many urban and rural communities, contaminating underground water resources. The solution is the formulation of present and new knowledge into a set of standards which will allow predictions of the effects of inputs on the system. In general, water has an inherent capacity to deal with pollution but our understanding of the way it deals with chemical pollution is negligible. We can predict in some general way that chemicals will react with other chemicals in the water and form new compounds which may or may not be harmful, that organisms will degrade toxic chemicals to more simple and maybe less toxic compounds and that toxic metals are difficult to change chemically and difficult to remove from water. However, few specific examples are available.

We can probably, in part, physiologically adapt to chemical pollution in terms of taste, odor, physiological response and perhaps even cellular response. This adaptability creates difficulties in relating the chemical components of a water supply to a health problem. It is well known that local residents find no cause to believe that their water supply can create grastroenteric problems for newcomers. However, it can be expected that there is a point at which no further adaptation can take place and that our health will be impaired by continuous ingestion of water containing a host of chemical substances some of which are proven to have carcinogenic, teratogenic, and mutagenic properties, and others of which can induce histopathological effects. These are effects which in most instances cannot be evidentially related to water.

In order to understand the meaning of chemical pollution of fresh water, a baseline is needed. This baseline varies with the intended use of water. For instance, water which is adequate for industrial use may not be acceptable for drinking purposes. The problem we are concerned with in chemical pollution and health is water intended for human consumption which contains chemicals at concentrations which can produce harmful effects on an acute or a chronic basis. Therefore, the baseline for a particular chemical would be a concentration which we know will not produce harmful effects.

An aspect of chemical pollution which should not be neglected is that which is concerned with the accumulation of chemicals in aquatic food sources. This accumulation can be both direct or indirect. In either case large concentrations of toxic chemicals in tissues have been demonstrated. While it is to be admitted that the consumption of fresh water sources of food is small compared to the consumption of water, this should be considered as a potential human health hazard.

The sources of chemical pollution are multiple and may be classified as arising from agricultural use (fertilizers and pesticides), natural sources (leaching of chemicals from geological formations), industrial manufacturing processes, domestic sources (detergents, pesticides) and accidental spills. In this report we are concerned with those sources which supply a continuous and often increasing rate of chemicals in water directly by the use of watercourses as a means of waste removal or indirectly by the purposeful or unintended use of chemicals in locations which are watersheds.

The supply of naturally occurring fresh water for the use of mankind is fixed and increasing pollution of water so that it becomes unusable, decreases the total quantity available for use for man's physiological and domestic needs, for industrial purposes, for recreational pursuits, for aesthetic enjoyment, and for aquatic life as a food source.

Methods for detecting chemicals in fresh water are technologically feasible provided that we know what we want to detect and given time to develop or modify methods and make the necessary determinations. Our current knowledge of chemicals in water has been entirely dependent upon the analytical methodology available and chemicals actually looked for. As a result the chemical pollution picture of fresh water is undoubtedly far from complete. We already know that certain rivers are replete with a host of chemicals some of which are known carcinogens, teratogens, and mutagens. Most of these have unknown fates and their toxicity to aquatic life and terrestrial plants, animals and man are poorly characterized.

Although public health emphasis on food quality has been with us for sometime, public health concern and action concerning water quality has not received nearly the same attention despite the proven presence of chemicals which have visibly changed the bio-environment so drastically in the past 50 years. At present, concern with food quality is centered on trace amounts of pesticides, fertilizers, preservatives, radioactive fission products, and carcinogens, representatives of which can be found in fresh water, but which to date have not elicited the same degree of concern or action.

Currently, municipal waters are treated principally to make them microbiologically safe for drinking. Very little is done to make them chemically safe and it is difficult to factually relate a human health problem with the chemical condition of our municipal water supplies. Since the successful control of communicable diseases in general and waterborne diseases in particular has increased our average life span, other health problems such as metabolic diseases, cardiovascular diseases, cancer and others have come to the fore. Although we consider these as diseases of our increased average life span, we do not know to what extent pollution is a contributory etiologic agent. On the other hand, we know that carcinogens exist in a proportion of our water supplies and we cannot assume that they are not contributory to the rate of cancer in our society. Unfortunately, evidence of the relationship between chemicals in water and the physical ills that beset us is tenuous.

Americans have become increasingly involved in the area of drug abuse and the probability of drugs reaching water supplies has increased. It is recognized that disposal of drugs in the waste water system is one means of destruction by both police departments and hospitals. This specific area of concern was excluded from consideration in this report.

Although it is difficult to extrapolate animal data to humans, the use of animals has served us well in the past for assessing the effects of therapeutic drugs, environmental stresses, psychological stresses, and chemical agents on man. The very fact that the bioecology of rivers has been changed by chemical pollution, should give us food for thought in a rapidly increasing general pollution problem. Therefore, in the general absence of human data, this report principally presents available animal toxicological and pathological data on chemicals actually found or potentially could be found in water so that some assessment of their effects on man can be made.

III. METHODS AND APPROACH

1. Literature Search

More than 7,000 publications, the titles of which appeared to be pertinent, were collected and examined. Of these, approximately 1,000 were found to have some pertinency and were examined more closely. Approximately 600 of these were actually found to have information which could be used. Only those publications which presented quantitative data were considered. Publications which contained pertinent data but which were published or received after completion of our information search are listed separately in the bibliography. In carrying out the literature search, the following sources were explored:

a. Abstracts and Indexes

Applied Science & Technology	1960-June 1970
Abstracts on Hygiene	1960-1969
Bibliography of Agriculture	1960-1969
Biological Abstracts	1960-May 1970
Chemical Abstracts	1907-June 1970
Excerpta Medica, Section 17, Public Health, Social Medicine and Hygiene	1968-1969
Index Medicus	1960-June 1970
Monthly Catalogue U.S. Government Publications	1960-March 1970
Public Health Engineering Abstracts	1962-1967
Publications of the U.S. Geological Surveys	1941-1964
Toxicity Bibliography	1968-March 1970
Water Pollution Abstracts	1950-February 1970
Technical Translations	1964-July 1967
University of Wisconsin Water Resources Center Eutrophication Program	March-July 1969

b. Journals

Air and Water Pollution	1964-1966
Archives of Environmental Health (Arch. Ind. Health)	1955-July 1970
Bulletin of Environmental Contamination and Toxicology	1966-1969
Food and Cosmetics Toxicology	1969-1970
Gigiena i Sanitaria (Hygiene & Sanitation)	1960-Jan. 1970
Journal of the American Water Works Association	1960-May 1970
Pesticides Monitoring Journal	1967-1969
Toxicology and applied Pharmacology	1969-1970
Water Pollution Control Federation Journal	1957-June 1970
Water Research	1967-1969
Journal of Environmental Health	1968-March 1970
WHO Technical Reports	1966-1968
Gesundheits-Ingenieur	1968-1969

c. Books, proceedings of symposia and international conferences, bibliographies and citations in review articles.

d. Once the chemicals which were demonstrated to be in fresh water and the chemicals which potentially could be found in water were compiled, existing acute and chronic toxicological information was searched and extracted.

Reviews, abstracts, papers and compilations of information on carcinogenicity, teratogenicity, and mutagenicity were examined for pertinent information.

Where possible, the more recent information was used in preference to information contained in the older literature.

2. Quality of Literature

The quality of the literature searched was not of a high order in terms of the information required for the purpose of this study. Much of the literature gave no rationale for why a chemical was selected for study. Information concerning the origin of a pollutant and its geographical location from the point at which the sample was taken for study was rarely reported. Descriptions of the waters being investigated, such as approximate width, depth, and velocity, which would give some general idea of dilution effects and therefore some idea of the quantities at the point of origin were never given. Interpretation of results, their meaning, conclusions, recommendations, and probable relationships of results to health was rarely discussed by investigators.

In general toxicity information poorly characterized dose relationships. Therefore, it was difficult to obtain from the data the probable concentrations which would be of interest for use in obtaining quality criteria. In fact, much of the toxicity data, although obtained for the specific purpose of characterizing toxicity effects, were not always relevant to the problem of formulating quality criteria. The information on carcinogenicity, mutagenicity and teratogenicity were not, in general, studied in terms of dose response. In chronic toxicity studies, including carcinogenicity studies, information such as dose, duration, species of animal used and frequency of administration of doses were not always given. Frequently doses were expressed in a manner which could not be converted to units used in most reports. The rationale for the doses selected for study were generally lacking. A disproportionately large effort was expended on pesticides and a disproportionately small amount of effort was put into chemical pollution of rivers and lakes as a result of industrial wastes.

In the United States, toxicity information were obtained on fish or other aquatic organisms of little use for the purpose of this study so that the Russian literature had to be used for toxicity information on mammals. The quality of the Russian literature suffered mostly from an absence of information on what was done and how it was done. Names of researchers were cited with no literature references and original works could not be examined. In many cases, the periodicals were not available or translations could not be obtained and results had to be taken directly from abstracts. In contrast to information in the English literature, the Russians did provide most of the acute and chronic toxicity information although their use of this information can be subject to criticism.

3. Information extracted

Where available, the concentrations of chemicals in water were obtained together with information as to source and location. Available information on chemicals which for one reason or another have not been measured in water, but have been considered in the literature to be potentially present in water, was also obtained along with information on source. Included in this toxicity data, information, where available, on duration, dose response, and specific effects were obtained for both chemicals which have been found in water and chemicals which have been considered to be potentially present in water. Only the oral route of administration was considered for inclusion. However, where no oral data is available an alternative route of administration is presented and denoted as such.

4. Chemical Organization of Information

It was hoped to use structure activity relationships as a means of predicting the potential toxicity of novel compounds. To further this end it was necessary to group compounds on the basis of their structural components which might lead to kindred toxicity. Therefore, compounds have been specifically classified under 17 major headings. Within a number of these major chemical groupings, sub-groupings exist so that compounds can be compared as to their toxicity and evaluated for the importance of various contributing constituents to the toxicity of these compounds. In this section chemical structures and their importance as pollutants of fresh water will be discussed.

In accord with standard organic chemical classification, the first category considered was the alkanes and alkenes. The unsubstituted forms of these compounds have low water solubility and in general a low degree of toxicity. They can occur in fresh water as natural pollutants arising from petroleum reserves but may also appear through their use as a basic material in the petrochemical industry or as solvents in numerous processes.

The halogenated alkanes and alkenes, by contrast, are all the result of chemical synthesis. By far the majority of these compounds which have been found in fresh water are chlorinated pesticides resulting from their use for agricultural purposes. These compounds have received special notoriety in recent years. While these compounds in general have a low solubility, their high degree of toxicity and resistance to natural degradation make them of great concern in considering potential human health hazard. Besides the hydrocarbon pesticides, other more simple halogenated alkanes and alkenes do exist and also show a resistance to decay, but these compounds in general are found to be less toxic. No nitroalkanes have been found as organic pollutants in water but some of these are potential pollutants. However, they make up a small group of compounds.

The alcohols are among the most soluble of organic compounds in water. Many of these compounds (carbohydrates) are natural food constituents and are of little danger, therefore, in terms of toxicity. Others of these compounds, arising from industrial processes and appearing in fresh water as industrial waste, do show toxic effects in mammals. However, in general, the lability of these compounds to both air and microbial oxidation gives them a short lifetime in water. Enhancement of microbial growth as a result of the presence of a pollutant would affect dissolved oxygen levels.

The amines are subdivided into different categories because of the different properties these may have in terms of structure activity relationships. The amines show a reasonable solubility in water. The aliphatic amines are produced by the petro-chemical industry. A number of these have been found as pollutants in water. As a class they show an acute toxicity of less than a gram per kilogram in mammals. Many of these compounds have a sufficient vapor pressure to be rapidly eliminated from water by evaporation.

The aromatic amines with a potential for being present in water are mostly derivatives of aniline. These compounds are related to dye manufacture and use. On the other hand, quarternary amines are most widely used and would appear in water because of their application as cationic surfactants.

The nitriles are nitrogen compounds containing the cyano group which, in certain cases, can be released as cyanide. These compounds are both pesticides and have a use in organic synthesis in the petro-chemical industry. According to the literature, only one of these compounds has been found as a pollutant of fresh water. Heterocyclic compounds in which nitrogen, sulphur or oxygen is incorporated into a ring structure with carbon atoms can occur as natural breakdown products of plants or bacteria. However, it is the use of such compounds as pesticides and their presence in some industrial wastes which is of more concern in relation to water pollution. Since the heterocyclic ring may serve as the base of many diverse chemical compounds, more divergency in toxicity is apparent in this subgroup. Thus in this group we have toxins such as nicotine and strychnine as well as some herbicides with a low degree of mammalian toxicity.

The carboxylic organic acids can also occur as natural components of fresh water. The straight chain acids are found in our own bodies and the short chain forms are one of the major end products of bacterial catabolism. However, another source of these compounds is their use in industry and the use of the phenoxyalkylacids as herbicides. All of these compounds, once diluted in water so as to limit their specific acidic effect, show a limited toxicity except in a few occasions where other portions of the molecule contribute.

The organic sulfates have not been looked for in fresh water. These compounds are used to some extent as detergents but not to the extent of the sulfonic acids. Sulfonics are the major active components of detergents and have been widely found as pollutants of fresh water. The form in which the major amount of alkylbenzene sulfonates are presently synthesized allows them to be readily degraded by microorganisms present in fresh water.

No carboxylic esters have been reported in fresh water. The labillity to hydrolysis of these compounds would make them nonpersistent.

Certain of these compounds which are being used as pesticides, however, do show a high degree of toxicity.

Amides (amine derivatives which are analogous to the esters) also have not been looked for in fresh water. Certain of the amides do have a high toxicity, however. Of more concern, because of their greater use as agricultural products, are the carbamates. Even though they degrade comparatively rapidly, their high acute toxicity in mammals should elicit some concern. Of lesser acute toxicity are the thiocarbamates. The final amine derivatives in our listing which are potential pollutants are the ureas. These are widely used as herbicides but do not have the acute toxicity of the carbamates or thiocarbamates.

The phosphate esters are a specific group of compounds which exist in fresh water solely because of their use as effective pesticides. They work specifically by inhibiting nerve transmission in both insects and man (although presumably more effectively in the former). They have not been widely reported in fresh water, probably because of their lability to hydrolysis.

The aldehydes, ketones and ethers are all products of industrial processes. A few have been used as pesticides and these specific compounds, because of other portions of their molecules, can be of concern toxicologically. However, these compounds also have not yet been reported as being present in fresh water. The group of compounds as a whole is otherwise generally innocuous. In fresh water these compounds are oxidized to carboxylic acids.

The unsubstituted aromatic compounds are not found at high concentrations in fresh water because of their limited solubility. These compounds can occur naturally in oil wastes or may be the result of industrial processes. Because of their limited solubility they present little threat for acute toxicity. However, their efficacy in carcinogenesis is well known and, for this reason, their presence in fresh water should be a matter of concern.

The phenols and quinones are hydroxylated aromatics with increased water solubility and toxicity. Some of these compounds arise from natural sources but most arise from industrial wastes or through their use as biocides. Many of these compounds have a high level of acute toxicity. A number of them have been discovered as pollutants of fresh water and their concentration in water is a subject of increasing concern. Many of these compounds interact in water with other materials to give less toxic derivatives.

The aromatic derivatives are widely distributed because of their production as industrial products and wastes or because of their use in agriculture. The most well known halogenated aromatic derivative is DDT. Compounds such as DDE and DDD are modifications of this material. The halogenated aromatic derivatives, just as the halogenated alkanes and alkenes, are extremely persistent in fresh water. In general, they have a low acute toxicity but many of the long-term effects of these compounds are just beginning to be realized. Because of their low solubility and, therefore, low concentration in water, they are presumably of little concern as a problem in drinking water but do become concentrated through the food chain where their real effect is felt. The other aromatic derivatives potentially to be found in fresh water contain nitro groups or alkyl groups. These compounds result from manufacturing processes or from petroleum wastes. In general they have a low acute toxicity.

Sulfur compounds which are potential pollutants do not have a unified mechanism of mammalian toxicity as in some of the other groupings, but may range from the lethal compound, mustard gas, to various mercaptans of low acute toxicity but high organoleptic effect.

Many of the organometallics are highly toxic. On the other hand, the polymers form a chemical class without any uniform basis in structure activity relations. The miscellaneous surfactants exhibit toxicity by alterations in membrane function. Other organics are listed in the final miscellaneous organic classification without any reference to structure-activity relations.

5. Indexing

In order to facilitate locating information on any particular chemical in this report, we have prepared an alphabetical index which consists of names of chemicals as used in this report with synonyms, chemical names, trade names, etc. This is presented in Section X.

IV. RESULTS

Table I lists the concentrations of organic pollutants that have been found in water based on the search of the literature. The chemicals listed in this table as in subsequent tables have been characterized and tabulated, where appropriate, by their chemical composition described earlier under Section III-4. The source of the chemical (agricultural pesticide, industrial waste, domestic waste, etc.) is also tabulated for each chemical where this information was available. The location of the sample is tabulated under a separate heading, and indicates where the sample was taken from. For a number of chemicals several concentrations found at the same location at different times or at different locations are indicated where this information was available.

No attempt was made in searching through the literature to assess the qualitative or quantitative results of the analytical data. The techniques used by different investigators, sampling techniques and the sensitivity of analytical procedures was not assessed. There will no doubt be variations even with the same investigator as more sensitive analytical techniques are employed.

The greatest proportion of compounds measured in fresh water was made up of pesticides. As pointed out earlier, sources were poorly characterized in terms of physical location, distance from point of test sample and topographical characteristics which would throw some light on the nature of chemical pollution of fresh water.

Where information was available on a sequential time basis, concentrations of pesticides varied considerably presumably due either to times of application of pesticides or to periods of rainfall run-off or both. Therefore, pertinent climatological data might have been helpful in assessing the characteristics of pollution with agricultural products. In some intensely agricultural areas, such as cotton growing areas, concentrations of pesticides in rivers and municipal water supplies reached relatively high levels.

Concentrations of pesticides in fresh water formed the largest contribution of the U.S. literature while the largest input of industrial and domestic sources of chemical pollution were obtained from the foreign literature. Thus, little information on industrial chemical pollution in the U.S. is available.

Table II presents acute and chronic toxicological information on chemicals presented in Table I. LD_{50} is the dose at which 50% of the animals die. TLm designates the Median Tolerance Limit which is the concentration which kills 50% of fish for the indicated time in hours. LC_{50} is the concentration at which 50% of fish die in 24 hours. TLm and LC_{50} were exclusively obtained on fish. LD_{50} formed the highest proportion of the acute toxicity information available and was exclusively for non-aquatic animals. Included under the LD_{50} column was data available on humans where fatalities can occur and are estimates only and are essentially LD_{100} data. As stated earlier, all doses are oral unless otherwise indicated if oral information was not available.

It will be noted that large gaps of information exist for chronic toxicity and the greatest proportion of the toxicological data presented in this table comes from the Russian literature. The doses presented for chronic toxicity are those which elicited an effect and where this was not available the doses used are presented. The chronic toxicity effects varied according to what was looked for. The Russian data included changes in conditioned behavior and insufficient information was presented in order to determine exactly how this was done. Other doses which may have been presented in the literature, but were excluded from this table are presented in the Quality Criteria Section because of the presumed relevancy to the problem associated with arriving at quality criteria.

Table III presents acute and chronic toxicity of potential organic pollutants of fresh water. This table is in all details similar to Table II with, however, the inclusion of sources. These chemicals are suspected to be in water because of their use for industrial, agricultural, and domestic purposes or because they are known to be involved in manufacturing processes the waste products of which are likely to be discharged into fresh water. This listing is probably incomplete but what is available involves a far greater number of chemicals than those which have been measured in water indicating that available factual information on chemicals in water gives an incomplete story of the total picture. Again, as with Table II, there are gaps in our knowledge of both acute and chronic toxicity information. The human data, though inadequate, are somewhat more meaningful than those presented in Table II.

Table IV presents the available information of chemicals the concentrations and effects of which have been examined in tissues. It will be noted that all information contained in this table refers to pesticides. In general, the data indicate that pesticides can be stored in the tissues of humans normally exposed to them. As a result of accidental exposure, deaths have occurred and large concentrations of these pesticides were found in tissue. Sequential data, where this was available, showed that some pesticides had increasing concentrations in body fat with time in the U.S. and Indian population but not in the English or in some cases in the French population, indicating that use of the pesticides in question had increased in the U.S. and India during the periods of study and had decreased or remained steady in countries like England and France. However, the possibility that these pesticides were accumulating over the period of study without any change in usage should not be excluded. The information in this table also appears to show that storage occurred in all animals studied. In general, the studies dealt poorly with characteristics of human population studied in terms of relative exposure potential. However, a few studies did give information of this nature and showed that concentrations in tissues were related to degree of exposure. In like manner, information on animal tissues showed extremely high tissue concentrations in animals living in highly pesticide treated areas. Data on aquatic animals generally indicated low concentrations as compared to man and terrestial animals, presumably because of the generally low concentration of pesticides in water as shown in Table I. In general, high concentrations of pesticides in tissues, at least of DDT, were found in India and Israel. Studies on storage of DDT as a function of dose ingested for a period of 12 and 18 months indicate that below 0.0034 mg/kg/day storage does not take place while doses higher than this show storage to be proportional to dosage.

Tables V and VI present the available information on the carcinogenicity of chemicals which have been found in water (Table I) and chemicals which could potentially be present in water (Table III). Most of the carcinogenicity information was obtained from books which summarize the available data on carcinogenicity of chemicals in general. By far the greatest majority of studies reported results on a few animals only and a few studies attempted to show a dose-response relationship. These tables include data obtained by oral administration and where this is not available, the results from other routes of administration are given in Tables Va and VIa. The dosage forms used varied considerably. Some were given in the diet and, therefore, the amount of chemical in terms of body weight cannot be computed without knowledge of food intake and weight of animals. In other instances, the oral dose was available as mg/kg of body weight. The incidence of appearance of tumors in many cases is not available and results are denoted only as positives. The results appear to be different depending upon the species of animals studied with mice giving the highest proportion of positives. Presumably many of the studies used mice selected for their susceptibility to tumor formation. In some studies there was a high incidence of tumor formation in rats used as controls.

Of the 66 chemicals the concentrations of which have been measured in water, 33 have been examined for carcinogenicity and of these 15 or approximately 45 percent were found to be positive in one or more animal tests. Of the 430 potential pollutants, 87 have been examined for carcinogenicity and 17 or approximately 20 percent were found to be potentially positive carcinogenic agents.

Tables VII and VIII present available information with more or less pertinency to mutagenicity and teratogenicity of chemicals measured in water and chemicals which potentially could be present in water. In considering presumptive tests for mutagenicity, caution is necessary in interpreting the results. It can be seen from the tables that a variety of test systems have been employed. Although these tell us different things about the mutagen and the nature of mutation, it should be remembered that most are of little reliability in terms of extrapolating to man. Further reservations with respect to pesticides (which constitute a large proportion of the compounds considered here) were expressed by others (337):"Although we can point to no pesticide now in wide use that has been demonstrated to be mutagenic, the overwhelming majority have, however, not been adequately tested, although appropriate methodologies are now available." Except in 11 instances in Tables VII and VIII, all the data relating to mutagenicity or chromosomal effects were obtained on plants or fungi. Of the 11 exceptions, 4 were obtained on human cells in culture, 6 on mice, 1 on the kangaroo rat, and 1 on the fruit fly. Of the 29 chemicals examined, all showed positive results in one form or another. Plant tissues were exposed to the agent usually by soaking in high concentrations, but duration of exposure was not available for these and the frequency and duration of dosage for the animal and human studies were not available or applicable.

The teratogenicity information was obtained on 32 chemicals and positive results were obtained on 29, and only 1 of these was obtained on humans while the rest were examined in mammals and the chick. The latter is often considered to be an overly sensitive system. The frequency and duration of these doses were not reported. The one human study concerned methyl mercury chloride and exposure was through eating contaminated fish. Teratogenic effects were seen in this instance.

Factors to be considered in assessing Toxicity Data

1. Chemical Interaction

The fate of active chemicals within the environment is important in assessing their ultimate toxicity. The reactions which are usually involved in the alteration of chemical species introduced into the biosphere are often quite simple and can be easily predicted, such as hydrolysis, air oxidation, and changes brought about by UV irradiation. Irradiation, for instance, converts dieldrin to photodieldrin, a compound with four times greater toxicity. The ability to predict the product of such reactions and to evaluate the toxicity of the resulting materials is possible because the water, air, and light necessary for these reactions are known parts of the biosphere. However, more complex interactions are possible which are not easily predictable.

It has recently been found that the two anilide herbicides, propanil and solan, are capable of interacting in the soil to yield an asymmetric azobenzene (22). The presence of this new and potentially toxic agent is dependent upon the high concentration of both propanil and solan available for degradation and subsequent reaction. This example illustrates the importance of having a thorough knowledge of the individual components involved in any chemical pollution situation before it can be stated that such chemicals are not present in the water at concentrations which may cause toxic symptoms. The extent and importance of such molecular interaction has not yet begun to be either appreciated or evaluated. Furthermore, the presence of interacting compounds, as with any chemical pollutant, can only be suspected until tests for their detection are available and used.

2. Microbial Decomposition

The molecular structure of almost all pollutants can be altered by the action of microorganisms. Such bacterial action is the basis of sewage treatment and is the major mechanism by which detoxification of our natural waters is effected. Structures, no matter how complex, can be metabolized by the concerted action of various microbial species to inorganic compounds (CO_2, NH_3, H_2S) and the structural elements of the organisms themselves (polysaccharides, proteins, lipids, nucleic acids, and the subunits of these macromolecules). Such structural elements themselves become part of the water's chemical milieu when the microorganisms die and disassociate.

The decomposition of any complex compound to inorganic end products is a dynamic process. It is uncommon for one organism to degrade fully any complex molecule intracellularly. Rather, individual species will usually effect a single oxidation, dechlorination, demethylation, hydrolysis, etc., converting a known material into one of many new compounds. For instance, depending on the species of microorganism present, even a resistant chemical like DDT (1,1-bis(p-chlorophenyl)-2,2,2-trichloroethane) may be converted to DDE (200), DDD, DDA, and a dicofol-like compound. Other acidic metabolites may also be formed (305).

It is often difficult to predict the compounds which will or will not be produced by microbial degradation. Of the 20 microorganisms capable of degrading DDT in the second study above, none produced DDE. Because of this, it is unrealistic to confine one's attention solely to known parent compounds in natural waters when assuredly the bacterial flora in the microenvironment will have produced a spectrum of metabolites, all of which may have their own toxicological properties. However, the data available does not allow an evaluation of the impact of chemical pollution beyond parent compounds.

3. Solubility

Many of the pollutant compounds which have been measured for acute and chronic toxicity have limited solubility in water. This may have led to errors in the past in arriving at LD_{50} values for such materials, especially for those measured using aquatic test animals such as fish. It has only recently been realized that the inconsistencies in the tolerance of fish to chlorinated pesticides have been due to the adsorption of these compounds to the walls of test containers, making them unavailable to the fish. The toxicity of such compounds may then vary with the material out of which the test container is constructed. This leads to errors in the data, in addition to those caused by such earlier recognized problems as loss by vaporization and hydrolysis during the course of the study.

In the natural state, chlorinated pesticides have been found adsorbed to microparticulates in suspension in fresh water. The presence of these toxic compounds in a colloidal state both decreases the reliability of determinations of their concentration in water, and provides a reservoir of such compounds which may dissociate back into the water system with time and decreased soluble concentration. The distribution of compounds on microparticulates may vary. Certain molecules may be adsorbed to inorganic colloids, while others may be associated with detritus and microorganisms. In addition, the presence of detergents in the water supply may alter the distribution of such compounds between the soluble phase and an adsorbed phase.

4. Analytical Accuracy

In an evaluation of this type the presence of a highly toxic material in low concentration is more important than the exact concentration of an inert material. Thus, it is essential that the analytical methods used be accurate. For instance, the liver toxicity associated with halothane is thought to be due to a 0.02% contamination by dichlorohexafluorobutene (65). The teratogenic effect of 2,4,5-T herbicide is even now in question because of the presence of active impurities in the samples tested (142).

Some of the analytical methods used in evaluating water quality are poorly applicable to the generation of data relevant to a toxicological evaluation. Atomic absorption spectroscopy indicates the concentration of elements but not their form. Thus, for example, it does not differentiate between metallic mercury, mercuric ion, and organomercurials, all of which have differing toxicities (306).

Those analytical methods which depend upon separatory methods for identification (TLC, GLC, liquid chromatography) are likely to miss or misidentify compounds with migration characteristics similar to expected compounds or compounds present in high concentration. The sensitivity of read out with these methods is also a source of error. Many highly toxic substances present in low concentration can be overlooked as a result of such considerations.

Then, too, certain analytical tests are designed to measure only a particular functional group and we find values in the literature for "phenol concentration". While biologically-derived phenols are generally innocuous, most industrially produced phenols do show some toxicity which varies with the compound tested. The same is true within any organic series.

5. Chemical Homogeneity

The literature contains data for both the toxicity and concentration in water sources of alkyl benzene sulfonates. While it is probably reasonable to correlate the two kinds of data in order to arrive at an estimate of the potential toxicity of such water sources, it should be realized that such a correlation is imprecise. Alkyl benzene sulfonate is a mixture of numerous similar compounds as are many industrial chemicals. Thus it is never certain that the chemical composition of a batch which was used for toxicity testing is the same as that found in fresh, natural water.

Commercial DDT contains less than 80% of the *p*,*p*-bis(dichlorophenyl)-tri-chloroethane. Most of the remainder is the *o*,*p*-isomer with a significant amount of DDD being present. Toxicity studies on such a compound would probably be performed using a homegeneous analytical grade of DDT, yet this compound would never be introduced into the environment in such a form. This fact, too, decreases the reliability of correlating toxicity data with water concentration data for a compound.

6. Altered Metabolism

The interaction of multiple pollutants within the test organism or within man is probably of greater importance in invalidating toxicological correlations than the chemical interactions occurring within the water system. The presence of one compound can entirely change the physiological disposition of another. Parathion, paraoxon and sumithion all interfere with the catabolism of propanil and thus cause the latter compound to show increased toxicity. A more important and commoner effect is the induction of liver enzyme systems, especially microsomal enzymes, which catalyze the more rapid degradation of common pollutants once induced. Thus the LD_{50} values obtained in single dose toxicity studies may bear no resemblance to the LD_{50} values one would find in an animal in which these metabolic enzymes had been increased by prior treatment with the same material or related materials. This effect is most important in relating toxicity to the real world where a continued input of drugs and foreign compounds through ingestion and possibly inhalation may cause these catabolic enzyme systems to exist continually in a more induced state.

Similarly, the increasing use of pesticidal synergists may greatly alter the toxicity of compounds with which they find themselves in association. The synergistic toxicity of a variety of actual and potential pollutants should be considered. The pyrethrum synergists, for instance, inhibit the microsomal oxygenase system in the insect. As such, they are important in preventing the rapid biodegradation *in vivo* of insecticides. However, such synergists may also prevent a similar degradation in man of a wide variety of organic compounds and hence cause increased toxicity.

Sources

Tables IX and X present chemicals which have been found in water (Table IX) and chemicals which could potentially be found in water (Table X) according to sources as given in the literature. The sources are ranked in accordance with the number of chemicals originating from each source and are categorized into three groups, namely industrial, agricultural and domestic. In the industrial category the sources which were defined as industrial without reference to the specific industry are listed separately. Since Table IX represents chemicals which have been measured in water on a more or less randomized basis, the number of chemicals originating from a particular source is a matter of chance rather than a matter of the contribution of a source to the total water pollution problem. On the other hand, Table X lists chemicals which could be present in water and, therefore, to some extent reflect the contribution of a source to the total problem of water pollution at least in terms of number of chemicals but not necessarily in terms of the health aspects of chemical pollution of water. Taking the two tables together we find that in the industrial category chemical plants contribute the highest number of chemicals which have been actually found or could potentially be found in fresh water and exceeds any other industrial source by at least a factor of 2.

The agricultural source of pollution is one of pesticides, while domestic sources of pollution consist of detergents. In terms of numbers of chemicals as well as classes of compounds, chemicals of industrial origin contribute to fresh water pollution to a greater extent than those originating from agricultural or domestic sources.

V. QUALITY CRITERIA

From the health point of view, chemical quality criteria of water should be based on concentrations of chemicals which, when exceeded, is likely to produce physiologic, toxicologic, histopathologic, carcinogenic, teratogenic, mutagenic and any other undesirable effects. Any of these can be considered to be health limiting indices. Although organoleptic effects are undesirable, they may not strictly be considered to have a health effect if threshold concentrations are below those indicating a demonstrable health effect as broadly defined above. However, this approach deals only with chemicals as entities in water and disregards the products of interactions between chemicals in water and alterations brought about by organisms and environmental factors. In addition, it ignores the synergistic biologic effects of chemicals acting in combination.

If we accept the premise that quality criteria should be based on the maximum ineffective concentration, then it would appear that the most important information we require for each chemical in water is that pertaining to the maximum concentration which can be shown to have no health effects in humans. Obviously, this cannot be obtained in a practical manner using humans except by epidemiological studies which, because of the variety of chemicals in water and the generally polluted condition of our environment together with adaptive compensations, cannot be expected to be fruitful in terms of specific information on some chemicals. This epidemiological approach in some instances has borne fruit and should not be eliminated from consideration. The beneficial (<8 ppm) and harmful concentrations (>10 ppm) of fluoride were demonstrated using this approach and undoubtedly it should be considered as being useful for assessing the effects of chemicals which are not easily altered in water and for which there are specific demonstrable effects. In general, however, we must resort to animal studies to obtain the necessary information but must consider the attendant problems of extrapolation to human effects.

Except for the Russian literature, the basis upon which different countries arrive at quality criteria is not clear. Publications which purport to discuss the rationale for arriving at quality criteria present generalizations which are of little value (70, 82, 109, 145, 146, 162, 163, 171, 172, 326, 327, 391, 398, 446). The Russians arrive at suggested maximum permissible concentrations by examination of three factors:

- Organoleptic thresholds using human subjects
- Biochemical oxygen demand
- Toxicological effects from acute, medium, and long-term animal studies

With this approach the lowest oral maximum ineffective dose obtained for the parameters examined and animal species tested is used as the MPC after direct conversion to mg/l.

Generally, their toxicological studies are carried out in one or more of 4 species, namely mice, rats, guinea pigs, and rabbits using the oral route of administration. From the acute studies, LD_{50} and acute toxic effects are determined. Chronic effects are examined in medium-term studies (1-2 months) and are further studied in long-term studies covering a period ranging from 5 to 8 months. From the data obtained, the suggested MPC is generally but not always based on the highest dose examined which does not induce an effect in either of the three factors studied. If we examine the table (Table XI) of reported maximum no-effect concentrations, we find that organoleptic effects form the highest proportion of cases. This general approach initiated by Cherkinskii (55, 59, 61) does not take into account effects which may be even more limiting, i.e. carcinogenicity, mutagenicity and teratogenicity. In addition, it is erroneous to assume that the highest dose which does not produce toxicological effects for the species of animals used is directly applicable to man. It may or may not be and a safety factor is undoubtedly desirable.

Within recent years we have increasingly recognized the importance of carcinogenic, teratogenic, and mutagenic effects of pharmaceutical agents and chemicals used as food additives. Tables V, VI, VII and VIII show that many of the chemicals which are found in water or potentially could be present in water are carcinogenic, teratogenic and/or mutagenic. To date these data have not been used systematically as limiting indices although food additives with carcinogenic properties are banned from use. Because of our daily physiological need for water, we are in much greater danger from the presence of these chemicals in water.

How carcinogenicity, mutagenicity and teratogenicity data can be used for setting water quality criteria is a question of some concern. Current regulations totally prohibit the addition of carcinogenic substances to foods regardless of how carcinogenicity was demonstrated in animals. At the time this report was written, the reasonability of this approach is being questioned and the alternative approach of a threshold dose is favored by some. However, as can be seen in Tables V and VI, evidence upon which the threshold approach to the question of carcinogens in water can be rationally considered is generally lacking.

An approach which prohibits the presence of carcinogenic chemicals in water is probably impractical and water quality criteria based on carcinogenicity may have to be resolved using the threshold approach. However, better information than is currently available will need to be obtained because currently available data are insufficient for the purposes of arriving at threshold doses.

Although no precedent exists upon which quality criteria of water can be based for teratogenicity and mutagenicity, the same questions and lack of data apply.

Information required specifically for use in arriving at quality criteria for water should be obtained by the oral route of administration.

On the basis of the information available, the most useful data for arriving at permissible concentrations are those obtained from chronic toxicity studies. However, acute toxicity data is useful for determining relative toxicity and for arriving at doses for chronic toxicity.

The information obtained from animal studies needs to be assessed in terms of arriving at a basis for permissible concentrations for humans. In this respect the limiting index selected will be the lowest maximum ineffective dose found for all the parameters examined and animal species studied. This, however, can only be used as a starting point.

The applicability of animal toxicity information for predictions of toxic effects in man can vary considerably depending upon the compound and the choice of species. It is readily apparent that the choice of an insect to determine the toxicity of an organophosphate in man would be absurd. The organophosphates are useful as selective insecticides because of the differential metabolic rate of these compounds between insects and higher forms of life. However, even among the chordates, great differences in toxicity of specific compounds are apparent. Rotenone is very toxic to fish; warfarin is selectively toxic to Norway rats and mice. An extreme example is the compound norbormide which shows no toxicity at 1,000 mg/kg in mice, cats, dogs, sheep, swine, or primates but has an oral LD_{50} of about 10 mg/kg in the Norway rat

A number of approaches to the problem of gaining information relating to the possible harmful effects of a compound using model species has been used. Attempts to obtain data which could more easily and effectively be applied to human beings using monkeys as experimental animals in toxicity studies have been made. It has been shown quite often, however, that although the monkey is a close phylogenetic relative of man, its metabolism quite often is not related. In a recent study of 23 anticancer drugs (358) it was found that the monkey was a predictor for organ-specific toxicity in man only 5 out of 8 times on the average. When dogs were included predictions were improved.

Attempts have been made to select a species which simulates man most closely in the absorption, distribution, metabolism and excretion of a compound and its metabolites. This is usually performed by giving the compound to a number of different species and selecting the one which simulates man most in its response and metabolism. This, of course, requires prior knowledge of the action and metabolism of the compound in man and although this approach is useful for screening a variety of chemically related compounds for pharmaceutical purposes, it may not be applicable for use in the wide variety of chemical species found in water.

Another attempt to obtain toxicological information which is applicable to man is the use of tissue culture techniques. These techniques involve the growing of human and animal cells outside of the body in chemically defined media. The advantages of this method are: the low cost of the technique, the fact that less compound is required, the ability to use cells of human origin, the establishment of reliable controls and the creation of exact conditions of concentration and local environment. Although this method holds great promise, the results obtained often do not correlate with clinical findings. By observing only the component parts of a complex system, one may miss effects which can be seen only with the whole system. The form and the concentration of an active compound which a cell is exposed to by the tissue culture approach may bear no resemblance to what that same cell may be exposed to within the living organism.

The Russians have faced this problem as applied to chemical pollutants of water (59) by administering the chemical to a number of animal species and selecting the species which proved to be most sensitive for more extensive study using a variety of parameters which involve a great deal of time and effort.

The foregoing serves as examples of the difficulties involved in using animal data for prediction of effects of chemicals in man and the problems involved in the toxicological evaluation of potentially harmful pollutants remain large.

Finally, the interaction of multiple compounds remains to be determined. As mentioned elsewhere in this report, the toxic effects evidenced when a person is brought into contact with one chemical entity within a short time after having been exposed to another may often be dramatically dissimilar to those evoked by either chemical alone. The type of analysis of the potential toxicological behavior of compounds present in fresh water presented in this report appears inadequate in relation to all these problems, but without extensive experimental programs, it is the best that can be performed in our current state of knowledge.

The exact means by which animal data can be used to arrive at permissible criteria will probably continue to be based on the availability of factual information combined with the best expert opinion and a reasonable inclination to err on the safe side. The Russian approach of directly applying the maximum ineffective concentration obtained in animals to man is not to be recommended.

With the above considerations in mind the available information on suggested maximum permissible criteria and information that can be used for arriving at permissible criteria can be examined for pertinency and usefulness.

Table XI presents reported maximum concentrations of organic chemicals which produce no effect when administered chronically or when tested for organoleptic effects in man. It will be noted that except in a few instances the sources for the information in this table are from Russian literature.

Approximately 80% of the data is derived from organoleptic effects using human subjects. In other words, the organoleptic threshold was found to be lower than either the biochemical oxygen demand doses or the maximum ineffective dose in toxicological animal studies.

Table XII presents the ranking of acute toxicity based on LD_{50} data and show that the chlorinated hydrocarbons are outstanding in terms of their intense acute toxicity as measured by LD_{50} in mammals. Since these compounds have all been found to be present in fresh water, it becomes of especial concern to direct our attention to them. Of the six compounds found to have an oral LD_{50} of 1-100 mg/kg, five of these compounds are chlorinated hydrocarbons. More specifically, endrin, isodrin, aldrin, endosulfan and toxaphene can be considered to be all derivatives of norbornene. It is interesting that, except for methyl mercuric chloride, the most toxic compounds now found in fresh water should all have the same basic chemical nucleus.

Heptachlor, the ninth entry in this ordered list, and chlordane also have the same chlorinated norbornene nucleus. Aside from these compounds, however, the other most highly acute toxic compounds do not share common structural features. Most of them do contain chlorine atoms, however. Thus, within those compounds that have a reasonably high toxicity (100-200 mg/kg LD_{50}) in addition to those compounds already mentioned, can be seen three hexachlorocyclohexanes (lindane and BHC); two forms of a chlorinated phenol; the organometallic methyl mercury compounds; the chlorinated diarylalkanes, DDT and DDD; two simple amines; a benzonitrile; an organic phosphate (Def); and two chlorinated phenoxyacetic acids (2,4,5-T and 2,4-D).

Examination of the rest of the list reveals similar compounds: amines (some organic), another phenoxycarboxylic acid, another organic phosphate, another chlorinated diarylakane and a number of phenolic compounds. The only new group of compounds present toward the latter part of this list is the surfactant family represented by different forms of alkyl benzene sulfonates.

A different picture presents itself among those organic compounds considered potential pollutants of fresh water which have not yet been reported to be present in fresh water and which are listed in Table XIII. Because of their greater number, it is probably best to turn our attention first to those compounds having an oral LD_{50} value of less than 10 mg/kg. Among this group of 23 compounds, 15 are phosphate esters. While the substituent groups may differ among these 15 compounds, it may be assumed that it is the phosphate ester constituent itself which is responsible for the high toxicity. The remaining eight compounds are substituted pyridines (nicotine and picoline); carbamates (Isolan and Temik); the substituted indanedione anticoagulant, diphacinone; acrolein; the organometallic, tetraethyltin; and acetone cyanohydrin (which is toxic due to the fact that it releases hydrogen cyanide).

Among the remaining compounds with an acute toxicity of 1-100 mg/kg, the organophosphorus compounds again make up the largest grouping, with 20 pesticides falling within this category. No other similarly large group is found. Seven of these remaining compounds are carbamates, five are phenols and four contain the nitrile group. The ability of the organic phosphate esters and of the carbamates, for instance, to rapidly hydrolyze in water, may prevent the accumulation of high concentrations of these materials in fresh water and so decrease the pollution hazard of these compounds.

It is apparent from the relatively small size of Table XIV that little has been published on the chronic threshold doses of compounds which may appear in fresh water. All of the data presented in this table are from the Russian literature and include threshold doses resulting from changes in conditioned reflex behavior. Most noticeable is the absence of pesticides from this table. Those which have been investigated, such as carbothione and simazine, are found to have a low ranking in terms of threshold dose. Most of the other compounds in the table are common organics which share little in terms of structural similarity. Extrapolations from this meager data is impossible because it is difficult to judge how much the presence of data on a functional chemical group is due to investigator interest or how much it is due to lack of investigation of other compounds.

The most noteworthy feature of Table XIV is the presence of the three organometallic compounds, tetraethyl tin, ethyl mercuric chloride, and diethyl mercury at the top of the listing. The next compound in the list has a 50-fold higher threshold dose than the least toxic of these compounds. Alcohols and diols are scattered throughout the list. Although the fourth through sixth compounds in order of decreasing toxicity are alcohols, it is difficult to call special attention to this group in terms of toxicity. This is likewise the case with the chlorinated compounds which are widely scattered throughout the list. The presence of both aliphatic and aromatic amines at the beginning and throughout the middle of the listing does not specifically call attention to amines as potentially toxic functions in relation to chronic threshold dose. To be able to determine toxicity information from such a ranking of threshold doses it would be necessary for many more compounds to be investigated and placed within such a ranking.

If, as noted elsewhere, threshold dose from chronic toxicity studies is an important means for arriving at quality criteria for chemicals in fresh water, the apparent incompleteness of this table indicates that efforts have not been particularly directed towards obtaining this information.

TABLE I - CONCENTRATION OF ORGANIC POLLUTANTS LOOKED FOR AND FOUND IN FRESH WATER

This table lists the concentrations of organic pollutants that have been found in water and tabulated, where appropriate, according to their chemical composition described under Section 3 and 4. The source and location of the chemicals are also tabulated where this information was available. For a number of chemicals several concentrations found at the same location at different times or at different locations are shown, if available. Concentrations of pesticides in fresh water form the largest contribution in the US literature while the largest input from industrial and domestic sources were obtained from the foreign literature.

TABLE I - CONCENTRATION OF ORGANIC POLLUTANTS LOOKED FOR AND FOUND IN FRESH WATER

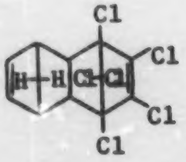
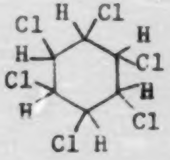
Ref	Agent	Source	Location	Concentration
			ALKANES AND ALKENES	
	UNSUBSTITUTED			
291	METHANE	dissolved gases	well water, Ill.	0.8 ml/1
	CH_4	" "	" "	87 ml/1
		product of anaerobic decomposition of organic matter in marshes, mines and sludge, digestion tanks; waste from natural gas & petroleum plants		
	HALOGENATED			
69	ALDRIN	pesticide 2-6 lb./acre	Snake R. Pullman, Wash.	0.001 mg/1
439			Hudson R. below Poughkeepsie N.Y.	presumptive Sept. 1964
			Maumee R. Toledo, Ohio	"
			Mississippi R. Dubuque, Iowa	"
			Detroit R. Detroit, Mich.	"
			Missouri R. Kansas City, Kans.	"
			Colorado R. near Boulder City Nev.	"
			Colorado R., Page, Arizona	0.085 ug/1 "
			Rio Grande, Brownsville, Tex.	presumptive "

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	ALDRIN (cont.)		Snake R. Ice Harbor Dam, Wash.	presumptive	Sept. 1964
174			Bear R. above Preston, Idaho	"	"
42			Snake R., Wash.	0.001 mg/1	"
		agricultural	Missouri R. at Nebraska	0.005 ug/1*	May 1966
			Arkansas R. at van Buren, Ark.	0.005 ug/1*	June 1966
			Snake R. at King Hill, Idaho	0.005 ug/1*	"
			Columbia R. at Dalles, Ore.	0.005 ug/1*	April 1966
139			Rio Grande, El Paso, Tex.	presumptive	1966
102, 447			Snake R. Pullman, Wash	0.001 mg/1	1967
37			Red R., Alexandria, La.	0.006 ug/1	1964
			Snake R. Wawawai, Wash.	0.003 ug/1	1959
			Chattahoochee R. Lanett, Ala.	0.0[illegible]2 ug/1	1962
			Savannah R., N. Augusta, S.C.	<0.001 ug/1	1958-65
			Merrimack R., Lowell Mass.	<0.001 ug/1	1961
			Yakima R., Richland, Wash.	<0.001 ug/1	1958
			Yellowstone R., Sidney, Mont.	<0.001 ug/1	1964
			19 stations in various river basins	presumptive	
259			Hudson R.	0.26 ug/1	1964
			other surface waters	0.11 ug/1, minimum value	1964-66

* samples taken monthly for one year

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
			ALKANES AND ALKENES	
357	ALDRIN (cont.)		400 samples (drinking water)	over 50 samples had detectable concentrations none over MPC
240		agricultural	Missouri R. at Nebraska City	0.02 ug/1* May 1968
			Brazos R. at Richmond, Tex.	0.01 ug/1* Feb. 1967
				0.04 ug/1* March 1967
			Rio Grande below Anzaldvas Dam, Tex.	0.02 ug/1* June 1967
			Colorado R., Yuma, Ariz.	0.02 ug/1* Feb. 1967
			Sacramento R., Verona, Calif.	0.01 ug/1* Feb. 1967
			Yakima R. Kiona, Wash.	0.01 ug/1* Oct. 1966
			Snake R., King Hill, Idaho	0.01 ug/1* Feb. 1967
			Columbia R., Dalles, Ore.	0.01 ug/1* Feb. 1967
24		formulating plants at Greenville, Clarksdale, Indianola	Mississippi R. tributaries	1966
		primary manufacturer of endrin and heptachlor, Memphis, Tenn.	Memphis Wolf R. Cypress Creek complex	1966-67
289	BENZENE HEXACHLORIDE  Cl H Cl H H Cl Cl H H Cl Cl H	pesticide	Tombigbee R. Ala.	found in fish

* samples taken monthly from each river for 2 years

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	BENZENE HEXACHLORIDE (cont.)		Martins Creek, Pa.	presumptive	1964
			Mississippi R. at West Memphis, Ark.	"	"
139			Connecticut R. at Enfield Dam, Conn.	0.004 ug/1	Sept. 1966
			Hudson R. at Narrows N.Y.	0.034 ug/1	"
			Apalachiocola R., Chattahoochee, Fla.	presumptive	
			Chattahoochee R., Lanett, Ala.	0.008 ug/1	"
			Allegheny R., Pittsburgh, Pa.	0.013 ug/1	"
			Ohio R., Evansville, Ind.	0.002 ug/1	"
			Ohio R., Cincinnati, Ohio	0.056 ug/1	"
			Ohio R., Addison, Ohio	0.026 ug/1	"
			Mississippi R., St.Paul, Minn.	0.012 ug/1	"
			St. Joseph R., Benton Harbor, Mich.	0.003 ug/1	"
			South Platte R., Julesburg, Colo.	0.022 ug/1	"
			Arkansas R., Ponca City, Okla.	0.008 ug/1	"
			Mississippi R., Vicksburg, Miss.	0.011 ug/1	"
			Rio Grande, El Paso, Tex.	0.023 ug/1	"
			Trinity R., Livingston, Tex.	0.013 ug/1	"
			Colorado R., Loma, Colo.	0.006 ug/1	"
			San Joaquin R., Vernalis, Calif.	0.008 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

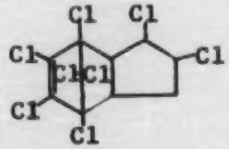
Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	BENZENE HEXACHLORIDE (cont.)		Delaware R., Martins Creek, Pa.	presumptive	1964
			Mississippi R., W. Memphis, Ark.	"	"
			Red R., Grand Forks, N.D.	0.004 ug/1	19655
			Ohio R. Cairo , Ill.	0.002 ug/1	"
			Verdigris R., Nowata, Okla.	presumptive	"
			Connecticut R., Enfield Conn.	"	"
			Monongahela R., Pittsburgh Pa.	"	"
			Apalachicola R., Chattahoochee, Fla.	0.022 ug/1	1958-64 CAM top ten
			Sacramento R., Green's Landing Calif.	0.011 ug/1	"
			Red R. Grand Forks, N.D.	0.004 ug/1	"
			St. Lawrence R., Massena, N.Y.	0.003 ug/1	"
			Missouri R., Kansas City	0.003 ug/1	"
			Savannah R., N. Augusta, S.C.	<0.001 ug/1	"
448		water supply cotton runoff areas		up to 0.75 ug/1	
134	CHLORDANE	pesticide applied at <1 lb./acre - not used on edible crops	rain water 0.15 in. Cincinnati - roof of Taft Center	0.5 mg/1	
139			Delaware Bay	presumptive	Sept 1966
			Roanoke R., John H. Kerr Reservoir and Dam	0.019 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

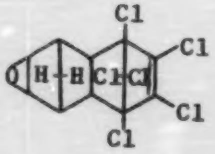
Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
139	CHLORDANE (cont.)				
			Chattahoochee R., Lanett, Ala.	0.075 ug/1	Sept. 1966
			Tennessee R., Bridgeport, Ala.	presumptive	"
			Missouri R., St. Louis, Mo.	"	"
			Sacramento R., Green's Landing, Calif.	0.006 ug/1	"
			Snake R. American Falls, Idaho	presumptive	"
24		primary manufacturer of endrin & heptachlor Memphis, Tenn,	Memphis Wolf. R., Cypress Creek complex		1966
		pesticide formulating plants	Horseshoe Bayou, Fish Lake, Greenville, Jone's Bayou at Cleveland & Sunflower at Clarksdale & Indianola		1966
440	DIELDRIN	pesticide	rain water 0.15 in. Cincinnati-roof of Taft Center	0.003 mg/1	
439	 Cl Cl Cl Cl H H		Connecticut R. below Northfield Mass.	>0.022 ug/1	Sept. 1964
			Connecticut R., Wilder Vt.	0.003 ug/1	"
			Hudson R. below Poughkeepsie N.Y.	0.008 ug/1	"
			Merrimack R. above Lowell, Mass.	>0.071 ug/1	"
			St. Lawrence R., Massena, N.Y.	0.003 ug/1	"
			Delaware R., Trenton, N.J.	0.009 ug/1	"
			Potomac R., Great Falls, Md.	>0.040 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	DIELDRIN (cont.)		Schuylkill R., Philadelphia, Pa.	>0.032 ug/l	Sept. 1964
			Shenandoah R., Berryville, Va.	0.005 ug/l	"
			Susquehanna R.,Sayre, Pa.	0.003 ug/l	"
			Apalachicola R., Chattahoochee, Fla.	0.016 ug/l	"
			Escambia R., Century, Fla.	presumptive	"
			Roanoke R., John H. Kerr Reservoir and Dam, Va.	"	"
			Savannah R., Port Wentworth, Ga.	0.020 ug/l	"
			Savannah R., N. Augusta, S.C.	>0.118 ug/l	"
			Clinch R. above Kingston, Tenn.	0.014 ug/l	"
			Tennessee R., Bridgeport, Ala.	0.006 ug/l	"
			Allegheny R., Pittsburgh, Pa.	presumptive	"
			Ohio R., at Evansville, Ind.	0.015 ug/l	"
			Ohio R., Cincinnati, Ohio	0.013 ug/l	"
			Wabash R., New Harmony, Ind.	0.004 ug/l	"
			Illinois R., Peoria, Ill.	0.003 ug/l	"
			Mississippi R., Cape Girardeau, Mo.	0.008 ug/l	"
			East St. Louis, Ill.	presumptive	"
			Burlington, Iowa	0.004 ug/l	"
			Lock and Dam 3 below St. Paul, Minn.	0.008 ug/l	"
			Rainy R., Baudette, Minn.	0.008 ug/l	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	DIELDRIN (cont.)		Red. R., Grand Forks, N.D.	0.004 ug/1	Sept. 1964
			Lake Michigan, Milwaukee, Wis.	0.007 ug/1	"
			Lake Superior, Duluth, Minn.	presumptive	"
			Big Horn R. Hardin, Mont.	0.012 ug/1	"
			Kansas R., DeSoto, Kans.	0.004 ug/1	"
			Missouri R., St.Louis, Mo.	0.012 ug/1	"
			Omaha, Nebr.	presumptive	"
			Yankton, S.D.	0.009 ug/1	"
			Bismark, N.D.	0.005 ug/1	"
			N. Platte R. above Henry Nebr.	0.006 ug/1	"
			Platte R. above Plattsmouth, Nebr.	0.023 ug/1	"
			S. Platte R., Julesburg, Colo.	0.016 ug/1	"
			Yellowstone R. near Sidney, Mont.	0.008 ug/1	"
			Arkansas R., Little Rock, Ark.	0.004 ug/1	"
			near Ponca City, Okla.	0.008 ug/1	"
			Coolidge, Kans.	presumptive	
			Mississippi R., New Orleans, La.	"	"
			New Roads, La.	0.016 ug/1	"
			Vicksburg, Miss.	0.017 ug/1	"
			Delta, Va.	presumptive	"
			West Memphis, Tenn.	"	"
			Red R. (south), Alexandria La.	0.007 ug/1	"
			Denison Tex.	0.003 ug/1	"
			Atchafalaya R., Morgan City, La.	0.009 ug/1	"
			Verdigris R., Nowata, Okla.	0.005 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	DIELDRIN (cont.)		Colorado R., Yuma, Ariz.	presumptive	Sept. 1964
			Parker Dam, Ariz.-Calif.	"	
			Bolder City, Nev.	0.002 ug/1	"
			Page, Ariz.	0.006 ug/1	"
			Loma, Colo.	0.008 ug/1	"
			Rio Grande, Brownsville, Tex	0.005 ug/1	"
			Laredo, Tex.	0.009 ug/1	"
			El Paso, Tex.	0.032 ug/1	"
			below Alamosa, Colo.	0.007 ug/1	"
			Columbia R., Clatskanie, Ore.	0.015 ug/1	"
			Pasco, Wash.	0.002 ug/1	"
			Pend Oreille R., Albeni Falls Dam, Idaho	presumptive	"
			Snake R., Ice Harbor Dam, Wash.	0.003 ug/1	"
			Wawawai, Wash.	presumptive	"
			Spokane R., Post Falls Dam, Idaho	0.007 ug/1	"
			Willamette R., Portland, Ore.	0.011 ug/1	"
			Klamath R. near Keno, Ore.	presumptive	"
			Sacramento R., Green's Landing, Calif.	0.004 ug/1	"
			Bear R. above Preston, Idaho	0.006 ug/1	"
42		agricultural	Missouri R. at Nebraska City, Nebr.	0.010 ug/1*	Oct. 1965

* sample taken monthly from each river for one year

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
			ALKANES AND ALKENES	
42	DIELDRIN (cont.)		Missouri R. at Nebraska City, Nebr.	0.005 ug/1* Feb. 1966
				0.015 ug/1* March 1966
				0.005 ug/1* April 1966
				0.015 ug/1* May 1966
			Arkansas R. below John Martin Reservoir, Colo.	0.005 ug/1* Oct. 1966
				0.005 ug/1* April 1966
			Arkansas R. at van Buren, Ark.	0.005 ug/1* Dec. 1965
				0.005 ug/1* Feb. 1965
				0.005 ug/1* Apr. 1966
				0.010 ug/1* July 1966
				0.010 ug/1* Aug. 1966
			Brazos R. at Richmond Tex.	0.010 ug/1* Feb. 1966
				0.015 ug/1* May 1966
				0.010 ug/1* June 1966
			Colorado R. at Wharton, Tex.	0.005 ug/1* Oct. 1965
				0.010 ug/1* Jan.-Feb. 1966
			Rio Grande below Anzalduas Dam, Tex.	0.010 ug/1* Oct. 1965
				0.015 ug/1* Nov. 1965
				0.015 ug/1* Dec. 1965
				0.010 ug/1* Jan. 1966
				0.010 ug/1* July 1965
			Colorado R. (Yuma Main Canal) at Yuma, Colo.	0.005 ug/1* March 1966
			Sacramento R. at Verona, Calif.	0.010 ug/1* March 1966
				0.005 ug/1* May 1966
			Yakima R. at Kiona, Wash.	0.005 ug/1* March 1966

* sample taken monthly from each river for one year

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
42	DIELDRIN (cont.)		Snake R. at King Hill, Idaho	0.005 ug/1*	April 1966
			Columbia R. at Dalles, Ore.	0.010 ug/1*	Dec. 1965
139			Connecticut R. Enfield Dam, Conn.	0.016 ug/1	Sept. 1966
			Connecticut R. Northfield, Mass.	0.017 ug/1	"
			Hudson R., Poughkeepsie, N.Y.	0.003 ug/1	"
			Hudson R., Narrows, New York	presumptive	
			Merrimack R., Lowell, Mass.	0.167 ug/1	"
			Delaware R., Trenton, N.J.	0.003 ug/1	"
			Delaware R., Martins Creek, Pa.	0.014 ug/1	"
			Schuylkill R. Philadelphia, Pa.	0.015 ug/1	"
			Delaware Bay	0.010 ug/1 0.025 ug/1	" "
			Shenandoah R., Berryville, Va.	0.008 ug/1	"
			Susquehanna R., Conowingo, Md.	0.031 ug/1	"
			Roanoke R., John H. Kerr Reservoir and Dam, Va.	0.006 ug/1	"
			Neuse R., Raleigh, N.C.	0.004 ug/1	"
			Alapachicola R., Chattahoochee, Fla.	0.004 ug/1	"
			Savannah R., Port Wentworth, Ga. North Augusta, Ga.	0.048 ug/1 0.110 ug/1	" "

* sample taken monthly from each river for one year

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
139	DIELDRIN (cont.)		Tennessee R., Bridgeport, Ala.	0.004 ug/1	Sept. 1966
			Lenoir City, Tenn.	0.005 ug/1	"
			Allegheny R., Pittsburgh, Pa.	0.004 ug/1	"
			Kanawha R., Winfield Dam, West Va.	0.015 ug/1	"
			Ohio R. Cairo, Ill.	0.004 ug/1	"
			Evansville, Ind.	0.004 ug/1	"
			Cincinnati, Ohio	0.003 ug/1	"
			Illinois R., Peoria, Ill.	0.003 ug/1	"
			Mississippi R., Cape Girardeau, Mo.	0.009 ug/1	"
			Mississippi R., E. St. Louis Ill.	presumptive	"
			Burlington, Iowa	0.007 ug/1	"
			Dubuque, Iowa	0.002 ug/1	"
			St. Joseph R., Benton Harbor, Mich.	presumptive	
			Grand R., Grand Haven, Mich	"	
			Kansas R., De Soto, Kansas	0.004 ug/1	"
			Missouri R., St. Louis, Mo.	presumptive	"
			Kansas City, Kans.	0.004 ug/1	"
			North Platte R. above Henry, Nebr.	0.004 ug/1	"
			Platte R. above Plattsmouth, Nebr.	0.004 ug/1	"
			Red R. (north), Grand Forks, N.D.	presumptive	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
139	DIELDRIN (cont.)		Red R., Intern. Boundary	presumptive	Sept. 1966
			Atchafalaya R., Morgan City, La.	"	"
			Arkansas R., Pendleton Ferry, Ark.	0.005 ug/1	"
			Fort Smith, Ark.	0.001 ug/1	"
			Ponca City, Okla.	presumptive	"
			Brazos R., Arcola, Tex.	0.004 ug/1	"
			Mississippi R., New Orleans, La.	0.005 ug/1	"
			Vicksburg, Miss.	0.003 ug/1	"
			Delta, La.	0.005 ug/1	"
			W. Memphis, Ark.	0.004 ug/1	"
			Red R. (S), Alexandria, La.	0.012 ug/1	"
			Rio Grande, below Alamosa, Colo.	presumptive	"
			Trinity R., Livingston, Tex.	0.012 ug/1	"
			Verdigris R., Nowata, Okla.	presumptive	"
			Bear R., Preston, Idaho	0.010 ug/1	"
			Colorado R., Page, Ariz.	0.003 ug/1	"
			Loma, Colo.	0.002 ug/1	"
			Sacramento R., Green's Landing, Calif.	0.003 ug/1	"
			Waikele Stream, Oahu, Hawaii	0.004 ug/1	"
			Columbia R., Clatskanie, Ore.	presumptive	"
			Snake R., Payette, Idaho	0.004 ug/1	"
			Willamette R., Portland, Ore.	0.004 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
139	DIELDRIN (cont.)		Tombigbee R., Columbus, Miss.	0.100 ug/1	1965
			Merrimack R., Lowell, Mass.	0.068 ug/1	"
			Savannah R., N. Augusta, S.C.	0.051 ug/1	"
			Kanawha R., Winfield Dam, W. Va.	0.045 ug/1	"
			Rio Grande, Alamosa, Colo.	0.029 ug/1	"
			Tennessee R., Lenoir City, Tenn.	0.028 ug/1	"
			Ohio R., Cairo, Ill.	0.028 ug/1	"
			Mississippi R., Dubuque, Iowa	0.024 ug/1	"
			Missouri R., Kansas City, Kans.	0.023 ug/1	"
			Savannah R., Pt. Wentworth, Ga.	0.022 ug/1	"
			Mississippi R., W. Memphis, Ark.	0.122 ug/1	1958-64 CAM
			Savannah R., Augusta, S.C.	0.056 ug/1	"
			Ohio R., Cincinnati, Ohio	0.055 ug/1	"
			Schuylkill R., Phila., Pa.	0.035 ug/1	"
			Mississippi R., New Orlean, La.	0.034 ug/1	"
			Delaware R., Phila., Pa.	0.033 ug/1	"
			Apalachicola R., Chattahoochie, Fla.	0.024 ug/1	"
			Mississippi R., Vicksburg, Miss.	0.023 ug/1	"
			Delta, La.	0.022 ug/1	"
			Savannah R., Pt. Wentworth, Ga.	0.016 ug/1	"
			Merrimack R., Lowell, Mass.	0.016 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
		ALKANES AND ALKENES			
37	DIELDRIN (cont.)		Connecticut R., Northfield, Mass.	presumptive	Sept. 1965
			Delaware R., Trenton, N.J.	0.018 ug/1	"
			Potomac R., Washington, D.C.	0.003 ug/1	"
			Great Falls, Md.	0.016 ug/1	"
			Schuylkill R., Phila., Pa.	0.014 ug/1	"
			Susquehanna R., Conowingo, Md.	0.002 ug/1	"
			Sayre, Pa.	presumptive	"
			Apalachicola R., Chattahoochee Fla.	0.016 ug/1	"
			Chattahoochee R., Lanett, Ala.	0.005 ug/1	"
			Clinch R., Kingston, Tenn.	0.007 ug/1	"
			Monongahela R., Pittsburgh, Pa.	0.005 ug/1	"
			Ohio R., Evansville, Ind.	0.002 ug/1	"
			Cincinnati, Ohio	0.006 ug/1	"
			Addison, Ohio	0.007 ug/1	"
			Maumee R., Toledo, Ohio	0.024 ug/1	"
			Mississippi R., E. St. Louis, Ill.	0.005 ug/1	"
			Burlington, Iowa	0.009 ug/1	"
			Lock & Dam 3, St. Paul, Minn.	presumptive	"
			Red R. (N), Grand Forks, N.D.	0.007 ug/1	"
			Detroit R., Detroit, Mich.	0.018 ug/1	"
			Lake Michigan, Milwaukee, Wis.	0.003 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

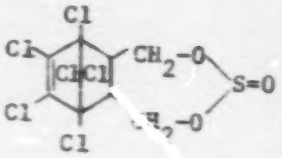
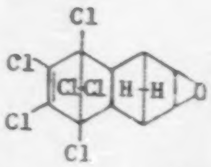
Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
37	DIELDRIN (cont.)		Kansas R., DeSoto, Kans.	0.003 ug/l	Sept. 1965
			Missouri R., St. Louis, Mo.	0.004 ug/l	"
			Kansas City, Kans.	0.023 ug/l	"
			Platte R., Plattsmouth, Nebr.	0.010 ug/l	"
			Atchafalaya R., Morgan City, La.	0.013 ug/l	"
			Mississippi R., New Orleans, La.	0.005 ug/l	"
			Vicksburg, Miss.	0.004 ug/l	"
			Delta, La.	0.004 ug/l	"
			W. Memphis, Ark.	0.018 ug/l	"
			San Juan R., Shiprock, N. Mex.	presumptive	"
			Rio Grande, El Paso, Tex.	0.003 ug/l	"
			Columbia R., Clatskanie, Ore.	0.003 ug/l	"
			Willamette R., Portland, Ore.	0.005 ug/l	"
			Sacramento R., Greens Landing, Calif.	0.011 ug/l	"
			San Joaquin R., Vernalis, Calif.	0.005 ug/l	"
			Waikele Stream, Hawaii	0.018 ug/l	"
448, 385			100 locations in U.S.	0.0000-0.118 ug/l	1965
24		Primary manufacturer of endrin & heptachlor Memphis, Tenn.	Memphis Wolf R., Cypress Creek Complex		1966-67

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
			ALKANES AND ALKENES	
24	DIELDRIN (cont.)	Pesticide formulating plants	Horseshoe Bayou and Fish Lake at Greenville, Jones Bayou at Cleveland and Sunflower R. at Clarksdale and Indianola	1966
			London, England (rainwater)	3.3-17.3 ug/l Aug. 66-July 67
			Britain	1.5-4.7 ug/l
			USA (river basins)	5.7-7.7 ug/l 1964 2.0-3.4 ug/l 1965
38		application to foliage soil and water courses	Savannah R., N. Augusta, S.C.	1962
259			Niagara R.	0.083 ug/l max. value August 1964 0.006 ug/l min. value Sept. 1965
			drinking water	found in 195 out of 455 samples
357				1 exceeds MPC
240		agricultural	Missouri R. at Nebraska City Nebr.	0.01 ug/l* March 1967 0.07 ug/l* June 1967 0.04 ug/l* May 1968
			Platte R., Brady, Nebr.	0.01 ug/l* Jan. 1968
			Arkansas R. below John Martin Reservoir, Colo.	0.01 ug/l* May 1968 0.01 ug/l* June 1968 0.01 ug/l* July 1968
			Brazos R. at Richmond, Tex.	0.01 ug/l* April 1968

* sample taken monthly from each river for two years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
240	DIELDRIN (cont.)	-	Colorado R., Wharton, Tex.	0.01 ug/l*	March 1967
			Gila R. below Gillespie, Ariz.	0.01 ug/l*	Nov. 1967
				0.02 ug/l*	April 1968
				0.01 ug/l*	Sept. 1968
			Yakima R., Kiona, Wash.	0.01 ug/l*	March 1967
				0.02 ug/l*	April 1967
				0.04 ug/l*	June 1967
				0.01 ug/l*	Oct. 67-July 68
			Snake R., King Hill, Idaho	0.01 ug/l*	June 1967
			Columbia R., Dalles, Ore.	0.01 ug/l*	Oct. 1966
309	ENDOSULFAN (Thiodan) 	pesticide spillage	Rhine R.		
	ENDRIN 	chlorinated organic pesticide			
23		manufacturing plants	Mississippi R. (119 points)	High	
224		pesticide, cane farming	surface waters in Louisiana	0.36 ug/l	1961
				0.70 ug/l	1964
439		pesticides	Connecticut R. below Northfield Mass.	0.25 ug/l	Sept. 1964

* sample taken monthly from each river for two years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	ENDRIN (cont.)		St. Lawrence R., Massena, N.Y.	presumptive	Sept. 1964
			Potomac R., Great Falls, Md.	0.94 ug/1	"
			Shenandoah R., Berryville, Va.	0.009 ug/1	"
			Escambia R., Century, Fla.	presumptive	"
			Susquehanna R., Sayre, Pa.	presumptive	"
			Clinch R., above Kingston, Tenn.	0.015 ug/1	"
			Tennessee R., Bridgeport, Ala.	0.005 ug/1	"
			Allegheny R., Pittsburgh, Pa.	presumptive	"
			Ohio R., Evansville, Ind.	"	"
			Mississippi R., E. St. Louis, Ill.	"	"
			Burlington, Iowa	0.004 ug/1	"
			Lock & Dam 3 below St. Paul	0.006 ug/1	"
			Rainy R., Baudette, Minn.	0.011 ug/1	"
			Red R. (N), Grand Forks, N.D.	0.023 ug/1	"
			Lake Michigan, Milwaukee, Wis.	0.006 ug/1	"
			Big Horn R., Hardin, Mont.	0.026 ug/1	"
			Kansas R., DeSoto, Kan.	0.005 ug/1	"
			Missouri R., St. Louis, Mo.	0.009 ug/1	"
			Bismark, N. D.	0.009 ug/1	"
			S. Platte R., Julesburg, Colo., S. Channel	0.014 ug/1	"
			Yellowstone R., near Sidney, Mont.	0.021 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	ENDRIN (cont.)		Arkansas R., Little Rock, Ark.	0.008 ug/l	Sept. 1964
			near Ponca City, Ark.	0.014 ug/l	
			Mississippi R., New Orleans, La.	presumptive	
			New Roads, La.	0.023 ug/l	
			Vicksburg, Miss.	0.025 ug/l	
			Delta, Miss.	presumptive	"
			W. Memphis, Ark.	"	"
			Red R. (S), Alexandria, La.	0.013 ug/l	"
			Denison, Tex.	0.007 ug/l	"
			Atchafalaya R.,Morgan City, La.	0.018 ug/l	"
			Verdrigis R., Nowata, Okla.	0.013 ug/l	"
			Colorado R., Yuma, Ariz.	presumptive	"
			Colorado R., above Parker Dam Ariz.	"	"
			Page, Ariz.	0.012 ug/l	
			Rio Grande, Laredo, Tex.	0.003 ug/l	
			El Paso, Tex.	0.067 ug/l	"
			Columbia R., Olatskanie, Ore.	0.019 ug/l	"
			Pasco, Wash.	presumptive	"
			Pend Oreille R., Albeni Fall Dam Idaho	"	"
			Willamette R., Portland, Ore.	0.017 ug/l	"
			Sacramento R., Greens Landing, Calif.	presumptive	"
			Bear R., above Preston, Idaho	0.009 ug/l	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
37	ENDRIN (cont.)		Delaware R., Trenton, N.J.	0.018 ug/1	Sept. 1965
			Tombigbee R., Columbus, Miss.	0.015 ug/1	"
			Clinch R., above Kingston, Tenn.	0.015 ug/1	"
			Tennessee R., Lenoir City, Tenn.	0.009 ug/1	"
			Kanawha R., Winfield Dam, W. Va.	presumptive	"
			Monongahela R., Pittsburgh, Pa.	0.014 ug/1	"
			Red R. (N), Grand Forks, N.Y.	0.009 ug/1	"
			Missouri R., St. Louis, Mo.	presumptive	Sept. 1965
			Platte R., above Plattmouth, Nebr.	"	"
			S. Platte R., Julesburg, Colo.	"	"
			Atchafalaya R.,Morgan City, La.	0.019 ug/1	"
			Mississippi R., Delta, La.	0.008 ug/1	"
			W. Memphis, Ark.	0.116 ug/1	"
			Colorado R., Page, Ariz.	presumptive	"
			Rio Grande, below Alamosa, Colo.	0.014 ug/1	"
			San Joaquin R., near Vernalis, Calif.	0.005 ug/1	"
			Mississippi R., W. Memphis, Ark.	0.214 ug/1	1958-1965
			New Orleans, La.	0.160 ug/1	"
			Vicksburg, Miss.	0.072 ug/1	"
			Delta, La.	0.044 ug/1	"
			Connecticut R., Enfield Dam, Conn.	0.023 ug/1	"
			Atchafalaya R., Morgan City, La.	0.015 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
139	ENDRIN (cont.)	pesticide	Connecticut R., Northfield, Mass.	0.014 ug/1	Sept. 1966
			Hudson R., Narrows, N.Y.	0.069 ug/1	"
			Roanoke R., John Kerr Reservoir and Dam, Va.	0.011 ug/1	"
			Neuse R., Raleigh, N.C.	0.008 ug/1	"
			Savannah R., Port Wentworth, Ga.	0.031 ug/1	"
			N. Augusta, Ga.	0.022 ug/1	"
			Tennessee R., Bridgeport, Ala.	0.004 ug/1	"
			Lenoir City, Tenn.	0.006 ug/1	"
			Allegheny R., Pittsburgh, Pa.	0.003 ug/1	"
			Lake Superior, Duluth, Minn.	0.022 ug/1	"
			Mississippi R., Dubuque, Iowa	0.003 ug/1	"
			St. Joseph R., Benton Harbor, Mich.	0.029 ug/1	"
			Missouri R., Kansas City, Kan.	0.005 ug/1	
			N. Platte R., above Henry, Neb.	0.009 ug/1	"
			S. Platte R., Julesburg, Colo.	0.063 ug/1	"
			Atchafalaya R., Morgan City, La.	0.006 ug/1	"
			Arkansas R., Fort Smith, Ark.	0.004 ug/1	"
			Mississippi R., New Orleans, La.	0.011 ug/1	"
			Vicksburg, Miss.	0.012 ug/1	"
			Delta, La.	0.014 ug/1	"
			Bear R., Preston, Idaho	0.019 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
139	ENDRIN (cont.)		Sacramento R., Greens Landing, Calif.	0.005 ug/1	"
			Clearwater R., Lewiston, Idaho	0.015 ug/1	"
			Columbia R., Bonneville, Ore.	0.009 ug/1	"
			Willamette R., Portland, Ore.	presumptive	
			Mississippi R.	up to .214 ug/1 0.015-0.116 ug/1	1963 1964
42		agricultural	Missouri R., Nebraska City, Nebr.	0.035 ug/1*	May 1966
			Colorado R., Wharton, Tex.	0.005 ug/1*	Oct. 1965
			Rio Grande below Anzalduas Dam, Tex.	0.010 ug/1* 0.040 ug/1* 0.025 ug/1*	Feb. 1966 May 1966 June 1966
			Colorado R. (Yuma Main Canal) Yuma, Ariz.	0.015 ug/1*	June 1966
			Snake R., King Hill, Idaho	0.025 ug/1*	Feb. 1966
269		commercial orchard	Knights Creek (Dunn County) Wis.		June 1966
			Mississippi R., Cape Girardeau, Mo.	0.013 ug/1	"
			Allegheny R., Pittsburgh, Pa.	0.012 ug/1	"
			Rio Grande, Brownsville, Tex.	0.011 ug/1	"
			Mississippi R., New Road, La.	0.010 ug/1	"
447			Mississippi and Sacramento R.	0.500 ug/1	
448			Analysis of water in 100 locations in the U.S.	0.0-0.94 ug/1	1966

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

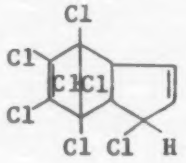
Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
24	ENDRIN (cont.)	primary manufacturer of endrin and heptachlor, Memphis, Tenn.	Memphis Wolf R., Cypress Creek Complex		1966-67
		pesticides formulating plants	Horseshoe Bayou and Fish Lake at Greenville, Jones Bayou at Cleveland and Sunflower R. at Clarksdale and Indianola		
23	HEPTACHLOR	pesticide	119 point along Mississippi R.	High concentration near plants which manufacture endrin and heptachlor	
439			Delaware R., Martin's Creek, Pa.	presumptive	Sept. 1964
			Potomac R., Washington, D.C.	"	"
			Escambia R., Century, Fla.	"	"
			Roanoke R., John H. Kerr Reservoir & Dam, Va.	"	"
			Savannah R., N. Augusta, S.C.	"	"
			Clinch R., Kingston, Tenn.	"	"
			Maumee R., Toledo, Ohio	"	"
			Red R. (N), Grand Forks, N.D.	"	"
			St. Claire R., Port Huron, Mich.	"	"
			Missouri R., Kansas City, Kan.	"	"
			S. Platte R., Julesburg, Colo. (N. Channel)	"	"
			Arkansas R., Ponca City, Okla.	"	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
439	HEPTACHLOR (cont.)		Mississippi R., New Orleans, La.	presumptive	Sept. 1964
			W. Memphis, Ark.	"	"
			Colorado R., Boulder City, Nev.	"	"
			Spokane R., Post Falls Dam, Idaho	"	"
310, 42		agricultural	Missouri R. at Nebraska City, Nebr.	0.005 ug/1*	Aug. 1966
			Arkansas R. below John Martin Reservoir	0.005 ug/1*	Oct. 1965
			Arkansas R., Reservoir, Colo.	0.010 ug/1*	May 1966
				0.005 ug/1*	July 1966
			at Van Buren, Ark.	0.005 ug/1*	March 1966
			Brazos R. at Richmond, Tex.	0.015 ug/1*	June 1966
			Colorado R., at Wharton Tex.	0.005 ug/1*	Oct. 1965
			Rio Grande below Anzalduas Dam, Tex.	0.010 ug/1*	Oct. 1965
				0.015 ug/1*	Dec. 1965
				0.005 ug/1*	Jan. 1966
				0.015 ug/1*	May 1966
			Yakima R. at Kiona, Wash.	0.005 ug/1*	July 1966
			Snake R. at King Hill, Idaho	0.005 ug/1*	Feb. 1966
139			Missouri R., Kansas City, Kans.	0.004 ug/1	Sept. 1966
37			Merrimack R., Lowell, Mass.	presumptive	Sept. 1965
			St. Lawrence R., Massena, N.Y.	0.031 ug/1	"
			Delaware R., Martins Creek, Pa.	0.025 ug/1	"

* samples taken from each river monthly for one year

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
37	HEPTACHLOR (cont.)		Potomac R., Great Falls, Md.	presumptive	Sept. 1965
			Savannah R., Pt. Wentworth, Ga.	"	"
			Tennessee R., Lenoir City, Tenn.	0.020 ug/1	"
			Kanawha R., Winfield Dam, W. Va.	presumptive	"
			Ohio R., Cincinnati, Ohio	0.024 ug/1	"
			Addison, Ohio	presumptive	"
			Wabash R., New Harmony, Ind.	0.009 ug/1	"
			Illinois R., Peoria, Ill.	presumptive	"
			Mississippi R., Burlington, Iowa	"	"
			Dubuque, Iowa	0.048 ug/1	"
			Red R. (N), Grand Forks, N.D.	0.115 ug/1	"
			Detroit R., Detroit, Mich.	0.015 ug/1	"
			Missouri R., St. Louis, Mo.	0.020 ug/1	"
			Kansas City, Kans.	0.008 ug/1	"
			Atchafalaya R., Morgan City, La.	0.010 ug/1	"
			Colorado R., Page, Ariz.	presumptive	"
			San Juan R., Shiprock, N. Mex.	0.012 ug/1	"
			Rio Grande, Brownsville, Tex.	0.035 ug/1	"
			Alamosa, Colo.	presumptive	"
			Sabine R., Ruliff, Tex.	"	"
			Sacramento R., Greens Landing, Calif.	0.020 ug/1	"
			Atachfalaya R., Morgan City, La.	0.002 ug/1	1958-65*

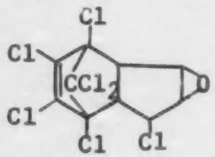
* Highest level during time studied

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
37	HEPTACHLOR (cont.)		Mississippi R., W. Memphis, Ark.	presumptive	1958-65
			Potomac R., Great Falls, Md.	"	"
			Detroit R., Detroit, Mich.	"	"
240			Missouri R., at Nebraska City	0.01 ug/l*	March 1967
				0.01 ug/l*	April 1967
				0.04 ug/l*	June 1967
			Arkansas R. below John Martin Reservoir, Colo.	0.01 ug/l*	Feb. 1967
				0.02 ug/l*	June 1967
			at van Buren, Ark.	0.01 ug/l*	March 1967
				0.01 ug/l*	April 1967
				0.01 ug/l*	May 1967
			Brazos R. at Richmond, Tex.	0.02 ug/l*	Feb. 1967
				0.02 ug/l*	June 1967
			Colorado R., Wharton, Tex.	0.01 ug/l*	Jan. 1967
			Rio Grande below Anzalduas Dam, Tex.	0.01 ug/l*	Feb. 1967
				0.01 ug/l*	March 1967
				0.02 ug/l*	June 1967
			Colorado R. (Yuma Main Canal), Yuma, Ariz.	0.01 ug/l*	March 1967
			Sacramento R. at Verona, Calif.	0.02 ug/l*	Feb. 1967
			Yakima R., Kiona. Wash.	0.01 ug/l*	Oct. 1966- April 1967
			Snake R., King Hill, Idaho	0.02 ug/l*	Feb. 1967
				0.01 ug/l*	March 1967
				0.04 ug/l*	April 1967

* samples taken monthly from each river for two years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
			ALKANES AND ALKENES	
240	HEPTACHLOR (cont.)		Columbia R., Dalles, Ore.	0.01 ug/1* Jan. 1967 0.01 ug/1* Feb. 1967 0.02 ug/1* March 1967 0.01 ug/1* June 1967
357			drinking water	50 out of 125 samples - none over MPC
24		manufacturer of endrin and heptachlor	Memphis Wolf R., Cypress Creek Complex	1966-1967
		pesticide formulating plant	Horseshoe Bayou and Fish Lake at Greenville, Jones Bayou at Cleveland and the Sunflower R. at Clarksdale and Indianola	1966
440	HEPTACHLOR EPOXIDE	pesticide	rain water 0.15 in. Cincinnati roof of Taft Center	0.04 ug/1
23			119 points along Mississippi R.	High conc. near plants manufacturing endrin and heptachlor
439			None detected in any river tested	Sept. 1964
42		agricultural	Missouri R. at Nebraska City, Nebr.	0.005 ug/1* May 1966 0.005 ug/1* July 1966
			Arkansas R. below John Marcin Reservoir, Colo.	0.005 ug/1* Oct. 1965 0.005 ug/1* Feb. 1966 0.005 ug/1* July 1966

* samples taken monthly from each river for one year.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
			ALKANES AND ALKENES	
42	HEPTACHLOR EPOXIDE (cont.)		Arkansas R. at van Buren, Ark.	0.005 ug/1* March 1966
			Brazos R. at Richmond, Tex.	0.005 ug/1* Feb. 1966 0.005 ug/1* April 1966
			Colorado R. at Wharton, Tex.	0.005 ug/1* Oct. 1965 0.005 ug/1* Jan. 1966
			Rio Grande below Anzalduas Dam, Tex.	0.005 ug/1* Oct. 1965 0.010 ug/1* March 1966
			Colorado R. (Yuma Main Canal), Yuma, Ariz.	0.005 ug/1* Jan. 1966
42		pesticide	Sacramento R. at Verona, Calif.	0.005 ug/1* Jan. 1966 0.005 ug/1* March 1966
			Yakima R. at Kiona, Wash.	0.005 ug/1* March 1966 0.005 ug/1* July 1966
			Snake R. at King Hill, Idaho	0.005 ug/1* Jan. 1966
			Columbia R. at Dalles, Ore.	0.005 ug/1* Jan. 1966
139			Connecticut R., Northfield, Mass.	0.001 ug/1 Sept. 1966
			Hudson R., Narrows, N.Y.	0.007 ug/1 "
			Schuylkill R., Philadelphia, Pa.	presumptive "
			Shenandoah R., Berryville, Va.	" "
			Neuse R., Raleigh, N.C.	0.008 ug/1 "
			Chattahoochie R., Lanett, Ala.	0.004 ug/1 "
			Savannah R., Pt. Wentworth, Ga.	0.006 ug/1 "
			Tennessee R., Bridgeport, Ala.	0.001 ug/1 "

* samples taken monthly for one year from each river.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
139	HEPTACHLOR EPOXIDE (cont.)		Kanawha R., Winfield Dam, W. Va.	presumptive	Sept. 1966
			St. Lawrence R., Massena, N.Y.	0.003 ug/1	"
			Lake Erie, Buffalo, N.Y.	presumptive	"
			Lake Superior, Duluth, Minn.	0.010 ug/1	"
			Mississippi R., Cape Girardeau, Mo.	0.002 ug/1	"
			St. Paul, Minn.	0.004 ug/1	"
			Fox R., Green Bay, Wis.	presumptive	"
			N. Platte R., Henry, Nebr.	0.004 ug/1	"
			Platte R., Plattsmouth, Nebr.	presumptive	"
			S. Platte R., Julesburg, Colo.	0.019 ug/1	"
			Mississippi R., New Orleans, La.	0.003 ug/1	"
			Delta, La.	0.007 ug/1	"
			Trinity R., Livingston, Tex.	presumptive	"
			Bear R., Preston, Idaho	0.005 ug/1	"
37			Lake Erie, Buffalo, N.Y.	0.002 ug/1	Sept. 1965
			Lt. Lawrence R., Massena, N.Y.	0.017 ug/1	"
			Delaware R., Martin's Creek, Pa.	presumptive	"
			Potomac R., Washington, D.C.	0.003 ug/1	"
			Great Falls, Md.	presumptive	"
			Schuylkill R., Philadelphia, Pa.	"	"
			Tombigbee R., Columbus, Miss.	"	"
			Tennessee R., Lenoir, Tenn.	"	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
37	HEPTACHLOR EPOXIDE (cont.)	---	Ohio R., Cairo, Ill.	0.002 ug/1	Sept. 1965
			Addison, Ohio	0.020 ug/1	"
			Wabash R., New Harmony, Ind.	0.012 ug/1	"
			Mississippi R., Burlington, Iowa	presumptive	"
			Dubuque, Iowa	0.067 ug/1	"
			Red R. (N), Grand Forks, N.D.	0.020 ug/1	"
			Detroit R., Detroit, Mich.	presumptive	"
			Missouri R., St. Louis, Mo.	0.007 ug/1	"
			Kansas City, Kan.	0.014 ug/1	"
			Platte R., Plattsmouth, Nebr.	0.002 ug/1	"
			Yellowstone R., Sidney, Mont.	presumptive	"
			Mississippi R., W. Memphis, Ark.	0.020 ug/1	"
			Colorado R., Page, Ariz.	presumptive	"
			Rio Grande, Brownsville, Tex.	"	"
			Sabine R., Ruliff, Tex.	"	"
			Yakima R., Richland, Wash.	0.002 ug/1	"
			Sacramento R., Greens Landing, Calif.	0.019 ug/1	"
			Mississippi R., W. Memphis, Ark.	0.020 ug/1	1958-65*
			Missouri R., St. Louis, Mo.	0.002 ug/1	"
			Mississippi R., New Orleans, La.	0.001 ug/1	"
			St. Lawrence R., Massena, N.Y.	0.001 ug/1	"
			Potomac R., Great Falls, Md.	<0.001 ug/1	"

* Highest levels during time studied

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

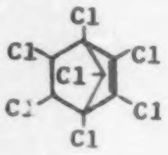
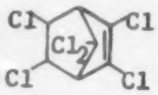
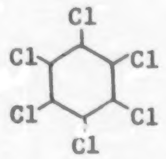
Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
240	HEPTACHLOR EPOXIDE (cont.)		Missouri R. at Nebraska City, Nebr.	0.02 ug/l	June 1967
			Yakima R. at Kiona, Wash.	0.04 ug/l	June 1967
23, 24	HEPTACHLORONORBORNENE  	close to plants manufacturing endrin and heptachlor	126 places in Mississippi R. between Tiptonville, Tenn. and New Orleans, La.	High	
		manufacturers of endrin and heptachlor	Memphis Wolf R., Cypress Creek Complex		
			below W. Memphis, Ark.	no residues in test sensitive enough to detect 0.1 mg/l	
23	HEXACHLORONORBORNADIENE	close to plants manufacturing endrin and heptachlor	126 places in Mississippi R. between Tiptonville, Tenn. and New Orleans, La.	High	
24	 	manufacturers of endrin and heptachlor	Memphis Wolf R., Cypress Creek Complex		
		pesticide formulating plants	Horseshoe Bayou and Fish Lake at Greenville, Jone's Bayou at Cleveland, and the Sunflower R. at Clarksdale and Indianola		
23	ISODRIN (endo-endo isomer of aldrin)	close to plants manufacturing endrin and heptachlor	126 places in Mississippi R. between Tiptonville, Tenn. and New Orleans, La.	High	

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
24	ISODRIN (cont.)	manufacturers of endrin and heptachlor	Memphis Wolf R., Cypress Creek Complex		
42	LINDANE (γ-BHC) 	pesticide			
		agricultural	Missouri R. at Nebraska City, Nebr.	0.005 ug/1*	Nov. 1965-May 1966
			Arkansas R. below John Martin Reservoir, Colo.	0.005 ug/1*	Oct. 1965
				0.010 ug/1*	Nov. 1965
				0.005 ug/1*	Dec. 1965
				0.010 ug/1*	Feb. 1966
				0.005 ug/1*	March 1966
				0.010 ug/1*	April 1966
				0.010 ug/1*	May 1966
			at van Buren, Ark.	0.005 ug/1*	Dec. 1965
				0.005 ug/1*	Feb. 1966
				0.010 ug/1*	March 1966
				0.005 ug/1*	April 1966
				0.005 ug/1*	May, 1966
			Brazos R. at Richmond, Tex.	0.005 ug/1*	Feb. 1966 April 1966 May 1966
			Colorado R. at Wharton, Tex.	0.010 ug/1*	Jan. 1966
				0.005 ug/1*	Feb. 1966
				0.020 ug/1*	April 1966
			Rio Grande below Anzalduas Dam, Tex.	0.010 ug/1*	Oct. 1965

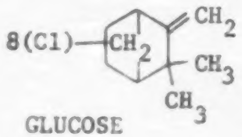
* sample from each river taken monthly for two years.

TABLE I. (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
42	LINDANE (cont.)		Rio Grande below Anzalduas Dam, Tex.	0.005 ug/1*	Nov. 1965
				0.010 ug/1*	Dec. 1965
				0.005 ug/1*	Jan. 1966
				0.005 ug/1*	Feb. 1966
				0.010 ug/1*	March 1966
				0.010 ug/1*	May 1966
				0.005 ug/1*	Aug. 1966
			Colorado R. (Yuma Main Canal) at Yuma, Ariz.	0.005 ug/1*	March 1966
				0.005 ug/1*	April 1966
				0.005 ug/1*	May 1966
			Sacramento R. at Verona, Calif.	0.005 ug/1*	March 1966
				0.005 ug/1*	April 1966
				0.005 ug/1	May 1966
			Yakima R. at Kiona, Wash.	0.010 ug/1*	March 1966
				0.010 ug/1*	April 1966
				0.005 ug/1*	May 1966
				0.005 ug/1*	July 1966
			Snake R., King Hill, Idaho	0.005 ug/1*	April 1966
			Columbia R., Dalles, Ore.	0.005 ug/1*	Feb. 1966
				0.005 ug/1*	March 1966
				0.005 ug/1*	April 1966
				0.020 ug/1*	Aug. 1966
447		cotton growing areas	river water and municipal water supply, Alabama	0.015-0.760 ug/1	
259			Lake Champlain	0.015 ug/1	Oct. 1965

* samples from each river taken monthly for period of one year.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ALKANES AND ALKENES		
240	LINDANE (cont.)		Arkansas R. below John Martin Reservoir, Colo.	0.01 ug/l*	July 1968
			Brazos R. at Richmond, Tex.	0.02 ug/l* 0.01 ug/l*	May 1967 Dec. 1967
			Rio Grande below Ansalduas Dam, Tex.	0.01 ug/l*	June 1967
			Pecos R. near Artesia, N. Mex.	0.01 ug/l*	Dec. 1967
			Gila R. below Gillespie Dam, Ariz.	0.02 ug/l* 0.02 ug/l* 0.02 ug/l* 0.01 ug/l* 0.01 ug/l* 0.01 ug/l* 0.01 ug/l*	Nov. 1967 Dec. 1967 Jan. 1968 March 1968 April 1968 May 1968 Sept. 1968
			Yakima R. at Kiona, Wash.	0.01 ug/l*	Oct. 1966
24		pesticide formulating plant	Horseshoe Bayou and Fish Lake at Greenville, Jones Bayou at Cleveland and Sunflower R. at Clarksdale and Indianola		1966
448	TOXAPHENE		water supply in cotton growing areas	0.0004 mg/l	
259			Mohawk R.	0.00075 mg/l	
157	GLUCOSE $C_6H_{12}O_6$		Lake Erken, Sweden	less than 6 ug/l all year	

* samples from each river taken monthly for two years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

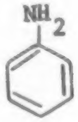
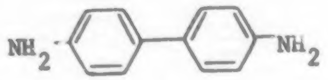
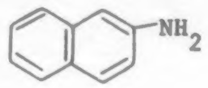
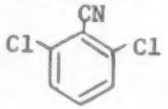
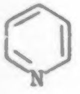
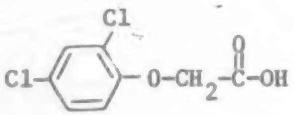
Ref	Agent	Source	Location	Concentration	
			AMINES		
ALIPHATIC					
288	DIETHYLAMINE $(C_2H_5)_2NH$	sewage from herbicides and synthetic rubber production	U.S.S.R. - river water sewage	up to 1000 mg/1	1967
	DIMETHYLAMINE $(CH_3)_2NH$	sewage from herbicides and synthetic rubber production	U.S.S.R. - river water sewage	up to 1000 mg/1	1967
	ETHYLAMINE $C_2H_5NH_2$	sewage from herbicides and synthetic rubber production	U.S.S.R. - river water sewage	up to 1000 mg/1	1967
	METHYLAMINE CH_3NH_2	sewage from herbicides and synthetic rubber production	U.S.S.R. - river water sewage	up to 1000 mg/1	1967
AROMATIC					
180	ANILINE (Phenyl-amine) 	dye, varnish, rubber, chemical and gas-plant wastes	Kama R. (foreign)	0-traces	
399	BENZIDINE 	dye and pigment factories	Sumida R. (Japan), Senjyu Bridge Shirahig Bridge Odai Bridge	0.257 mg/1 0.205 mg/1 0.439 mg/1	Dec. 1964

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AMINES		
399	NAPHTHYLAMINE 	dye and pigment factories	Sumida R. (Japan) Odai Bridge	0.290 mg/1*	1964
			Senjyu Bridge	0.387 mg/1*	"
			Shirahige Bridge	0.275 mg/1*	"
NITRILES					
110	2,6-DICHLOROBENZONITRILE (Dichlobenil) 	pesticide	irrigation waters in Colo.	8.82 ug/1	
HETEROCYCLICS					
87	PYRIDINE 	coke chemical plant's waste water	Zaporozh'e U.S.S.R.	9.6 mg/1	
			Dnepropetrovsk U.S.S.R.	17.4 mg/1	
			Ol'Khov U.S.S.R.	5.0 mg/1	
		waste water of gas generating plants	Gomel glass plant U.S.S.R.	22.4 mg/1	
			Dulev porcelain plant	15.0 mg/1	
			Gus-Khrustal glass plant	23.4 mg/1	
			Tula "Podzemgas" Station	15.6 mg/1	
			ORGANIC ACIDS		
CARBOXYLIC					
273	ACETIC ACID CH_3COOH	beet sugar, winery, vinegar, soured-fruit, wood distillation, textile, or chemical waste	Ohio R.	25.2 ug/1	
			Lake Erken, Sweden	<10 ug/1	

* naphthylamine and benzidine

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ORGANIC ACIDS		
273	BUTYRIC ACID (Butyrate) $CH_3CH_2CH_2COOH$	used to decalcify hides for varnishes mfg. of esters in artificial flavorings	Ohio R.	0.18 ug/1	
273	CAPROIC ACID $CH_3(CH_2)_4COOH$		Ohio R.	2.5 ug/1	
42	2,4-I	agricultural pesticide		not present in rivers studied 1965-1966 taken each month	
240		agricultural	Missouri R. at Nebraska City, Nebr.	0.07 ug/1*	Dec. 1967
				0.12 ug/1*	May 1968
				0.08 ug/1*	June 1968
			Yellowstone R. near Billings, Mont.	0.02 ug/1*	May 1968
				0.07 ug/1*	Aug. 1968
			James R. at Huron, S. D.	0.07 ug/1*	Oct. 1967
				0.08 ug/1*	April 1968
				0.11 ug/1*	June 1968
				0.35 ug/1*	July 1968
				0.19 ug/1*	Oct. 1968
			Arkansas R. below John Martin Reservoir, Colo.	0.04 ug/1*	May 1968
				0.24 ug/1*	June 1968

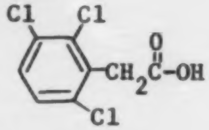
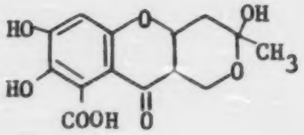
* samples taken every month for 1-2 years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ORGANIC ACIDS		
240	2,4-D (cont.)		Arkansas R. at Van Buren, Ark.	0.06 ug/l*	Aug. 1967
				0.13 ug/l*	Dec. 1967
				0.05 ug/l*	April 1968
				0.03 ug/l*	May 1968
				0.03 ug/l*	June 1968
				0.11 ug/l*	Aug. 1968
			Canadian R. near Whitefield, Okla.	0.06 ug/l*	April 1968
				0.01 ug/l*	May 1968
			Brazos R. at Richmond, Tex.	0.01 ug/l*	Sept. 1967
				0.06 ug/l*	April 1968
				0.07 ug/l*	May 1968
				0.11 ug/l*	July 1968
			Colorado R. at Wharton, Tex.	0.05 ug/l*	April 1968
			Green R. at Green River, Utah	0.06 ug/l*	Sept. 1968
			Humboldt R. near Rye Patch, Nev.	0.08 ug/l*	Aug. 1968
			Sacramento R., Verona, Calif.	0.03 ug/l*	May 1968
			Yakima R., Kiona, Wash.	0.18 ug/l*	Aug. 1967
				0.30 ug/l*	Sept. 1967
				0.05 ug/l*	April 1968
				0.24 ug/l*	May 1968
				0.33 ug/l*	June 1968
				0.21 ug/l*	July 1968
				0.29 ug/l*	Aug. 1968
			Snake R., King Hill, Idaho	0.14 ug/l*	Aug. 1967
				0.06 ug/l*	Oct. 1967
				0.05 ug/l*	June 1968
				0.10 ug/l*	July 1968

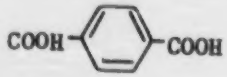
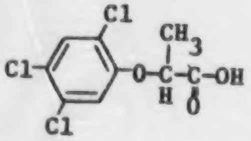
* all samples taken every month for 1-2 years.

TABLE L (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ORGANIC ACIDS		
240	2,4-D		Columbia R., Dalles, Ore.	0.02 ug/1* 0.03 ug/1*	Nov. 1967 May 1968
CARBOXYLIC					
110	FENAC 	pesticide	irrigation water, Colo.	8.82 mg/1	
273	FORMIC ACID (Formate) HCOOH	decalcifier, reducer in dying wool fast colors, dehairing and pulping hides, tanning, sizing rubber processing	Ohio R.	24.6 ug/1	
31	FULVIC ACID 		10 samples from colored water	87.1% of total organics	
273	ISOBUTYRIC ACID $(CH_3)_2CHCOOH$		Ohio R.	0.3 ug/1	

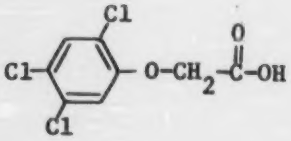
* all samples taken every month for 1-2 years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ORGANIC ACIDS		
273	ISOVALERIC ACID $(CH_3)_2CHCH_2COOH$		Ohio R.	0.22 ug/1	
273	PROPIONIC ACID (Propionate) CH_3CH_2COOH	manufacturing of ester solvents fruit flavors, perfume	Ohio R.	0.38 ug/1	
325	TEREPHTHALIC ACID 	production of Laosan waters, fibers	industrial reservoir	0.1 mg/1	
273	VALERIC ACID $CH_3CH_2CH_2CH_2COOH$		Ohio R.	0.16 ug/1	
42	SILVEX (Kuron)	pesticide	none found in western rivers studied 1966		
240			Brazos R., Richmond, Tex.	0.02 ug/1* 0.02 ug/1* 0.02 ug/1*	Nov. 1966 Aug. 1967 Sept. 1967
			Colorado R., Wharton, Tex.	0.01 ug/1*	Feb. 1968

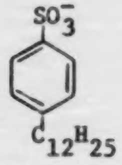
* collected monthly for two years.

TABLE I (CONT). - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ORGANIC ACIDS		
240	SILVEX (cont.)		Humboldt R., Rye Patch, Nev.	0.05 ug/1*	Oct. 1967
				0.02 ug/1*	March 1968
				0.03 ug/1*	April 1968
				0.02 ug/1*	April 1968
				0.01 ug/1*	June 1968
				0.21 ug/1*	July 1968
				0.13 ug/1*	Aug. 1968
				0.12 ug/1*	Sept. 1968
			Sacramento R., Verona, Calif.	0.01 ug/1*	Oct. 1967
			Columbia R., Dalles, Ore.	0.03 ug/1*	Oct. 1966
440	2,4,5-T		roof of Taft Center, Cincinnati Ohio (rainwater)	0.04 mg/1	
42			Western Rivers studied 6 mos. 1966	none present	
			Arkansas R. below John Martin Reservoir, Colo.	0.02 ug/1*	Nov. 1967
				0.02 ug/1*	July 1968
			van Buren, Ark.	0.02 ug/1*	Sept. 1967
				0.01 ug/1*	Nov. 1967
				0.04 ug/1*	Dec. 1967
				0.02 ug/1*	March 1968
				0.02 ug/1*	April 1968
				0.02 ug/1*	June 1968
				0.02 ug/1*	July 1968
				0.04 ug/1*	Aug. 1968
			Canadian R., Whitefield, Okla.	0.04 ug/1*	Dec. 1967
				0.03 ug/1*	Feb. 1968
				0.02 ug/1*	March 1968

* samples taken monthly for 1-2 years.

TABLE I (CONT). - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			ORGANIC ACIDS		
240	2,4,5-T (cont.)		Canadian R., Whitefield, Okla.	0.04 ug/l*	April 1968
				0.03 ug/l*	May 1968
				0.03 ug/l*	July 1968
				0.03 ug/l*	Sept. 1968
			Brazos R., Richmond, Tex.	0.02 ug/l*	Aug. 1967
				0.06 ug/l*	Sept. 1967
				0.02 ug/l*	Oct. 1967
				0.01 ug/l*	July 1968
			Colorado R., Wharton, Tex.	0.01 ug/l*	April 1968
			Pecos R., Artesia, N. Mex.	0.05 ug/l*	April 1968
			Green R., Green River, Utah	0.07 ug/l*	Sept. 1968
			Sacramento R., Verona, Calif.	0.01 ug/l*	Oct. 1967
				0.03 ug/l*	Dec. 1967
				0.01 ug/l*	Feb. 1968
			Yakima R., Kiona, Wash.	0.01 ug/l*	Sept. 1967
SULFONICS					
69	ABS (Alkyl benzene sulfonate)	detergent, industrial waste		0.6 mg/l	
243		surfactants	Italian surface water	3.5-100 mg/l	
20		anionic detergent	Czechoslovakia	0.5 mg/l	
		synthetic detergent	Worcestershire	0.03 mg/l	
369		synthetic detergent	Wisc. well water	10 mg/l	
			River and water supplies in 32 U.S. cities	$\leq$0.14 mg/l av. = 0.024 mg/l	

* samples taken monthly 1-2 years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
			ORGANIC ACIDS	
297	ABS (cont.)	detergent	Michigan well waters (30 wells)	
			surface water	0.0-0.6 mg/l (21 wells)
4			32 U.S. cities	0.00-0.14 mg/l (before 1961)
267			Ill. streams	3.0 mg/l highly polluted water 0.01 mg/l unpolluted waters
78			Ill. rivers	0.5 mg/l
154			streams in Kansas	1.9-6.6 mg/l
			Ohio R. at Wheeling, W. Va.	up to 12 mg/l, daily average 4 mg/l
			Cincinnati, Ohio	0.1 mg/l
			sewage in various cities	4-45 mg/l
			Ottawa, Kansas sewage	39-44 mg/l
			9 cities in Kansas (sewage)	4.1-34 mg/l
			Aurora, Ill. (sewage)	45 mg/l
			Indianapolis, Ind. (sewage)	42 mg/l
			Benton Harbor, Mich.	8 mg/l
			Maiais des Cygnes R., Kan.	3.9-6.6 mg/l
			Neosha R., Kansas	1.0-1.9 mg/l
			Creek R., Kansas	11 mg/l
			U.S. average (average)	10 mg/l
			Tama R., Japan	15:18) ratio of linear alkylate sulfonates to branch chain NBS measure by infra-red spectroscopy
				20:80)
			Nogawa R., Japan	25:75)

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

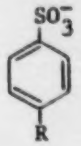
Ref	Agent	Source	Location	Concentration
			ORGANIC ACIDS	
396	ABS (linear)	detergent	Illinois R.	<0.01 mg/1
394			U.S. rivers	<0.01 mg/1
32		sewage water	French cities	3.08-3.5 mg/1
			U.S. cities	1-15 mg/1
			Ruhr R.	0.7-4.5 mg/1
			Seine R.	0.125 mg/1
			Rhone R.	0.03 mg/1
			water works in England	0.5 mg/1
395	ABS (MBAS)		Ohio R., Cincinnati, Ohio	0.06-0.15 mg/1
			most U.S. rivers prior to 1960	0.01-0.02 mg/1
			Illinois R.	0.5-1.3 mg/1 1959
			at Peoria (pre LAS)	0.056 mg/1 Sept. 1959-June 1965
			at Peoria (LAS)	0.022 mg/1 July 1965-June 1966
161	ABS		Coons Rapids, upper Mississippi R.	<0.15 mg/1 1963-64
			Spring Lake, upper Mississippi R.	<0.49 mg/1 "
			Upper Mississippi R., near Spring Lake	up to 1.11 mg/1 "
427		anion detergent	Modena(town sewage truckline) (outgoing canal)	23.18 mg/1 33.6 mg/1
395		14 waste processing plants	Germany	5.4 mg/1 1962-1964
			Ohio R., Cincinnati, Ohio	0.06-0.15 mg/1 1965

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

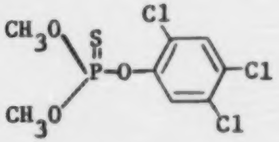
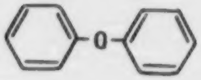
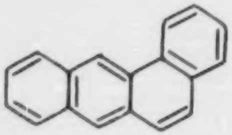
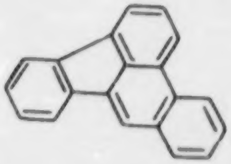
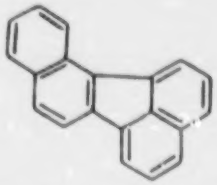
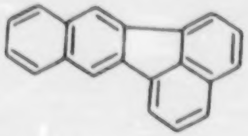
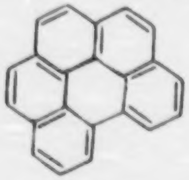
Ref	Agent	Source	Location	Concentration
			ORGANIC ACIDS	
395	ABS (cont.)		most rivers	0.01-0.02 mg/l
			Illinois R.	>0.5 mg/l 1964
			sewage works in England	3.0 mg/l 1962 (pre LAS) 1.3 mg/l 1965 (post LAS)
			waste processing plant, Germany	5.4 mg/l 1962 (pre LAS)
			U.S. activated sludge plant	5.0 mg/l (pre) Sept. 1965 0.7 mg/l (post) Mar. 1965
	MBAS (ABS & LAS)		Illinois R.	0.56 mg/l (pre) Sept. 1959-June 1965 0.22 mg/l (post) July 1965-June 1966
39			community water supplies; Camden, N.J.	0.034 mg/l Aug. 1959 0.024 mg/l winter 1959 0.015 mg/l spring 1960
			rivers in U.S.	<0.5 mg/l
			PHOSPHATE ESTERS	
440	RONNELL (Trolene) 	pesticides	Roof of Taft Center, Cincinnati, Ohio (rainwater)	0.2 mg/l

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
			PHOSPHATE ESTERS	
403	Def (S,S,S-Tributyl-phosphorothioate) $(CH_3-CH_2-CH_2-CH_2-S)_3-P{=}O$	chemical manufacturing plant	outfalls of manufacturing plant Ashlex R., Charleston Harbor, S.C.	1966
			ETHERS	
261	PHENYL ETHER 	industrial waste from perfuming soaps and organic synthesis	St. Clair R., Ohio R.	<10 mg/1
			UNSUBSTITUTED AROMATICS	
34, 35	1,2-BENZANTHRACENE* 		central portion of Rhine R.	10 & 18 mg/kg dry material from paper chromatography and absorption spectra respectively

* value found is for combination of all these compounds

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
			UNSUBSTITUTED AROMATICS	
34, 35	3,4-BENZOFLUORANTHENE* 		central portion of Rhine R.	10 & 18 mg/kg dry material from paper chromatography and absorption spectra respectively
34, 35	10,11-BENZOFLUORANTHENE* 		central portion of Rhine R.	10 & 18 mg/kg dry material from paper chromatography and absorption spectra respectively
34, 35	11,12-BENZOFLUORANTHENE * 		central portion of Rhine R.	10 & 18 mg/kg dry material from paper chromatography and absorption spectra respectively
32			sludge from Lake Constance	15 mg dry substance
34, 35	1,12-BENZOPERYLENE* 		central portion of Rhine R.	10 & 8 mg dry substance

* value found is for combination of all these compounds

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

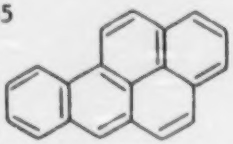
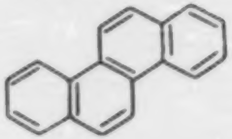
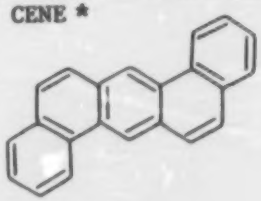
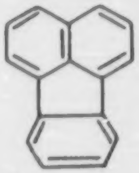
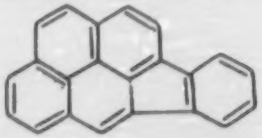
Ref	Agent	Source	Location	Concentration
			UNSUBSTITUTED AROMATICS	
35	3,4-BENZOPYRENE			
336, 35			drinking water	0.01 ug/1
34			central portion of Rhine R.	
97		industrial (petroleum)	Volga R. below Imeni P.I. Mendileeva refinery	0.0001 ug/1
			sample of sand from filter of Novoyaroslavskii Waterworks	0.216 ug/kg dry sand
409		sewage from shale refineries, coke plants, petroleum refineries	U.S.S.R.	0.03-0.3 mg/1
			water supplies of above	0.001 mg/1
32		sewage from thermal processing of shales	U.S.S.R. (plant effluent)	0.5 mg/1
		tunnel method on sewage from thermal processing of shales	U.S.S.R.	9 mg/kg
		coke gas plant	sewage effluent	0.13-0.29 mg/1
		processing Kerosene		6 mg/1
		coke chemical plant		0.52-0.63 mg/1
		coke chemical plant	35 km downstream from plant	8.2-17.0 mg/kg (sediment from river)
			dried sediment from Seine R.	1.5 mg/100 g
			Lake Constance	15 mg/kg dry substance
363		oil refinery	Moscow region; absorbed into soil and makes way to water eventually consumed by man	

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

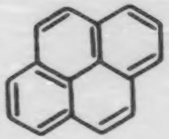
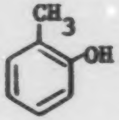
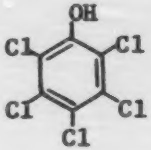
Ref	Agent	Source	Location	Concentration
			UNSUBSTITUTED AROMATICS	
56	3,4-BENZOPYRENE (cont.)	plants processing coke and coal tar products	U.S.S.R. (plant effluent)	3 ug/1-0.29 mg/1
32			sludge from Lake Constance	15 mg dry substance
156		shale by-product manufacture	U.S.S.R. effluent	0.1 mg/1
		Slansty combine	U.S.S.R. effluent	0.312 mg/1
		coke by-product	U.S.S.R. effluent	0.04 mg/1
		coke-gas plant	U.S.S.R. effluent	0.13-0.29 mg/1
		Neflegaz plant	U.S.S.R. effluent	3-0.03 mg/1
		oil refinery	U.S.S.R. effluent	none
79		"Shist" plant resins	U.S.S.R.	
		(effluents - untreated)		10.9 mg/kg
		(effluents - treated)		0.312 mg/kg
			Plyasa R. (site of discharge)	0.012 mg/kg
			(3.5 km downstream)	0.001 mg/kg
		effluent of petroleum chemical enterprises	U.S.S.R. Grozny	
348		a. eff. from thermal cracking, coking & pyrolysis		0.48-5.0 ug/1
		b. calalytic cracking		0.05-0.29 ug/1

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentratio
			UNSUBSTITUTED AROMATICS	
34	CHRYSENE* 		central portion of Rhine R.	10 & 18 mg/kg dry material
97	1,2,5,6-DIBENZANTHRACENE * 	petroleum refineries	Volga R., U.S.S.R. central portion of Rhine R.	not determined 10 & 18 mg/kg dry material
	FLUORANTHENE* 		central portion of Rhine R.	10 & 18 mg/kg dry material
	INDENO(1,2,3-cd)PYRENE * 		central portion of Rhine R.	10 & 18 mg/kg dry material

* value found is for combination of all these compounds

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent		Source	Location	Concentration
				UNSUBSTITUTED AROMATICS	
	PYRENE* 			central portion of Rhine R.	10 & 18 mg/kg dry material
				PHENOLS AND QUINONES	
170	CRESOL		distillation and chemical treatment of coal tar or wood tar	Poland (tap water)	0.030 mg/1
		(m-cresol)			0.060 mg/1
					0.120 mg/1
		(p-cresol)			0.200 mg/1
		(o-cresol)			0.160 mg/1
53	PENTACHLOROPHENOL 		roof timbers sprayed (house)	cold water storage tank	

* value found is for combination of all these compoundr

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

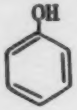
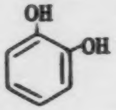
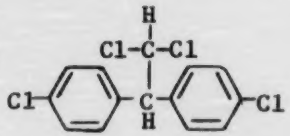
Ref	Agent	Source	Location	Concentration
			PHENOLS AND QUINONES	
103	PHENOL	industrial and domestic waste	Hakensack R. basin	NS-13.0 ug/1
		waste water	Passaic R. basin	NS-21.0 ug/1
		waste water	Elizabeth & Rahway R.	NS-79.0 ug/1
		industrial waste	Raritan R. basin	NS-210.0 ug/1
141			Rhine R. at Ludwigshaven	0.40 mg/1 Nov.-Dec. 1962
137		tannery sewage		10-20 mg/1
181			Poland (tap water)	0.050 mg/1 0.100 mg/1 0.200 mg/1
419		thermal processing of oil shale	U.S.S.R. (effluent)	small amount
235			Missouri R., Omaha, Nebr. (spring run-off)	0.00-10.0 mg/1 1951-66
16	PHENOLS & OIL RESIDUES	certain parts of rivers not subject to industrial pollution; suggests a biogenic origin of phenols in surface water	two regions of Rumania	
246	PYROCATECHOL	regenerator of the Syava wood chemical factory	U.S.S.R. (effluent)	none
		Amzya wood chemical factory	(effluent)	none

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration
		PHENOLS AND QUINONES		
246	PYROCATECHOL (cont.)	effluent from continuous neutralization at the Dimitrievskii wood chemical factory	U.S.S.R	none
		effluent from the washing of pyrolyzate	U.S.S.R.	1700 mg/1
		wash water from ethyl acetate manufacturing		350 mg/1
		wash water from Syava wood chemical factory		none
		total discharge from the pumping station of the Syava wood chemical factory		5 mg/1
		general drain pit of the tar-distillation shop of the Syava wood chemical factory		1260 mg/1
		supposedly pure water		none
		effluent from the alcohol shop of the Syava wood chemical factory		traces

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
HALOGENATED					
304	DDD (TDE)	spray 0.02 ppm for gnat control	Clear Lake, Calif.		
439		pesticide	Shenandoah R., Berryville, Va.	0.083 ug/1	Sept. 1964
42		agricultural	Arkansas R., John Martin Reservoir, Colo.	0.010 ug/1*	May 1966
			van Buren, Ark.	0.005 ug/1*	March 1966
				0.010 ug/1*	Aug. 1966
			Brazos R., Richmond, Tex.	0.005 ug/1*	Feb. 1966
				0.010 ug/1*	May 1966
			Rio Grande, Anzalduas Dam, Tex.	0.005 ug/1*	Oct. 1965
				0.010 ug/1*	Nov. 1965
				0.010 ug/1*	May 1966
				0.015 ug/1*	July 1966
				0.010 ug/1*	Sept. 1966
			Sacramento R., Verona, Calif.	0.010 ug/1*	Aug. 1966
			Yakima R., Kiona, Wash.	0.005 ug/1*	June 1966
				0.010 ug/1*	July 1966
269		commercial orchard	Knights Creek, Dunn County, Wis.		June 1966
139			Connecticut R., Enfield Dam, Conn.	0.013 ug/1	Sept. 1966
			Hudson R., Poughkeepsie, N.Y.	0.006 ug/1	"
			Narrows, N.Y.	0.005 ug/1	"
			Merrimack R., Lowell, Mass.	0.007 ug/1	"
			Delaware R., Trenton, N.J.	presumptive	"

* samples taken monthly.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
139	DDD (cont.)		Schuylkill R., Philadelphia, Pa.	0.009 ug/l	Sept. 1966
			Delaware Bay	0.005 ug/l	"
				presumptive	"
			Raritan R., Perth Amboy, N.J.	0.012 ug/l (bottom)	"
			Potomac R., Great Falls, N.Y.	0.012 ug/l	"
			Susquehanna R., Conowingo, Md.	0.003 ug/l	"
			Sayre, Pa.	0.005 ug/l	"
			Neuse R., Raleigh, N.C.	0.006 ug/l	"
			Apalachicola R., Chattahoochee, Fla.	presumptive	"
			Chattahoochee R., Lanett, Ala.	0.011 ug/l	"
			Savannah R., Port Wentworth, Ga.	0.004 ug/l	"
			N. Augusta, Ga.	presumptive	"
			Tennessee R., Bridgeport, Ala.	0.006 ug/l	"
			Tombigbee R., Columbus, Miss.	0.008 ug/l	"
			Kanawha R., Winfield Dam, W. Va.	0.005 ug/l	"
			Ohio R., Evansville, Ind.	0.003 ug/l	"
			Addison, Ohio	0.004 ug/l	"
			St. Mary's R., Sault Ste. Marie, Mich.	presumptive	"
			Lake Superior, Duluth, Minn.	0.005 ug/l	"
			Maumee R., Toledo, Ohio	0.006 ug/l	"
			Illinois R., Peoria, Ill.	0.006 ug/l	"
			Mississippi R., St. Paul, Minn.	0.006 ug/l	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
139	DDD (cont.)				
			St. Joseph R., Benton Harbor, Mich.	0.013 ug/1	Sept. 1966
			Grand R., Grand Haven, Mich.	0.009 ug/1	"
			Detroit R., Grosse Isle, Mich.	0.012 ug/1	"
			Fox R., Green Bay, Wis.	0.007 ug/1	"
			Missouri R., St. Louis, Mo.	0.003 ug/1	"
			Kansas City, Kan.	0.010 ug/1	"
			N. Platte R., Henry, Nebr.	0.006 ug/1	"
			Platte R., Plattsmouth, Nebr.	0.005 ug/1	"
			S. Platte R., Julesburg, Colo.	0.002 ug/1	"
			Rainy R., Beaudette, Minn.	0.005 ug/1	"
			Red R. (N), Intern. boundary	presumptive	"
			Atchafalaya R., Morgan City, La.	0.010 ug/1	"
			Arkansas R., Pendleton Ferry, Ark.	0.012 ug/1	"
			Ponca City, Okla.	0.005 ug/1	"
			Mississippi R., Vicksburg, Miss.	presumptive	"
			Delta, La.	0.008 ug/1	"
			Rio Grande, Brownsville, Tex.	0.013 ug/1	"
			El Paso, Tex.	0.009 ug/1	"
			Alamosa, Colo.	0.002 ug/1	"
			Sacramento R., Green's Landing, Calif.	0.009 ug/1	"
			San Joaquin R., Vernalis, Calif.	0.009 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
139	DDD (cont.)		Waikele Stream, Oahu, Hawaii	0.009 ug/l	Sept. 1966
			Snake R., Wawawai, Wash.	0.006 ug/l	"
			Spokane R., Post Falls Dam, Idaho	0.004 ug/l	"
			Willamette R., Portland, Ore.	0.003 ug/l	"
37			Hudson R., Poughkeepsie, N.Y.	presumptive	Sept. 1965
			Merrimack R., Lowell, Mass.	0.007 ug/l	"
			St. Lawrence R., Massena, N.Y.	0.010 ug/l	"
			Delaware R., Trenton, N.Y.	0.018 ug/l	"
			Potomac R., Washington, D.C.	0.007 ug/l	"
			Chattahoochee R., Lanett, Ala.	0.012 ug/l	"
			Savannah R., Port Wentworth, Ga.	0.006 ug/l	"
			Ohio R., Cairo, Ill.	0.003 ug/l	"
			above Addison, Ohio	presumptive	"
			Missouri R., Kansas City, Kans.	0.011 ug/l	"
			Platte R., Plattsmouth, Nebr.	0.010 ug/l	"
			Yellowstone R., Sidney, Mont.	0.005 ug/l	"
			Red R., Alexandria, La.	0.008 ug/l	"
			Brazos R., Arcola, Tex.	presumptive	"
			Rio Grande, Brownsville, Tex.	0.026 ug/l	"
			Williamette R., Portland, Ore.	0.013 ug/l	"
			Klamath R., Keno, Ore	presumptive	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
37	DDD (cont.)		Waikele Stream, Hawaii	0.008 ug/1	Sept. 1965
			Delaware R., Philadelphia, Pa.	0.080 ug/1	1958-1965 CAM samples Top ten
			Savannah R., N. Augusta, S.C.	0.031 ug/1	
			Rio Grande, Brownsille, Tex.	0.019 ug/1	
			El Paso, Tex.	0.012 ug/1	
			Mississippi R., New Roads, La.	0.012 ug/1	1958-1965 CAM samples Top ten
			Red R., Alexandria, La.	0.011 ug/1	
			San Joaquin R., Vernalis, Calif.	0.010 ug/1	
			Rio Grande, Laredo, Tex.	0.009 ug/1	
			Apalachicola.R., Chattahoochee, Fla.	0.008 ug/1	
			Sacramento R., Green's Landing, Calif.	0.006 ug/1	
156			Clear Lake, Calif.		
259			Maximum value in Niagara R.	0.083 ug/1	Aug. 1964
				no trace since 1964	
			U.S. surface waters	0.006 ug/1	Sept. 1965
240			Arkansas R., van Buren, Ark.	0.01 ug/1*	May 1967
			Canadian R., Whitefield, Okla.	0.01 ug/1*	Dec. 1967
			Brazos R., Richmond, Tex.	0.03 ug/1*	May 1967
				0.01 ug/1*	Oct. 1967
				0.01 ug/1*	Jan 1968
				0.01 ug/1*	March 1968
				0.01 ug/1*	July 1968

* sample taken monthly for 2 years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
240	DDD (cont.)		Colorado R., Wharton, Tex.	0.01 ug/1*	June 1967
				0.01 ug/1*	Nov. 1967
				0.04 ug/1*	Jan. 1968
				0.01 ug/1*	Feb. 1968
				0.01 ug/1*	March 1968
				0.01 ug/1*	July 1968
				0.01 ug/1*	Aug. 1968
			Rio Grande, Anzalduas Dam, Tex.	0.01 ug/1*	June 1967
				0.01 ug/1*	Oct. 1967
			Gila R., Gillespie Dam. Ariz.	0.01 ug/1*	Nov. 1967
				0.02 ug/1*	Dec. 1967
				0.01 ug/1*	March 1968
				0.02 ug/1*	May 1968
				0.01 ug/1*	June 1968
				0.01 ug/1*	Sept. 1968
			Sacramento R., Verona, Calif.	0.01 ug/1*	Nov. 1966
			Yakima R., Kiona, Wash.	0.02 ug/1*	Jan. 1967
				0.02 ug/1*	April 1967
				0.01 ug/1*	Oct. 1967
				0.02 ug/1*	Dec. 1967
				0.01 ug/1*	Feb. 1968
				0.01 ug/1*	June 1968
				0.02 ug/1*	July 1968
				0.01 ug/1*	Aug. 1968
			Columbia R., Dalles, Ore.	0.01 ug/1*	Oct. 1966
				0.01 ug/1*	Nov. 1967
				0.01 ug/1*	Jan. 1968

* samples taken monthly for two years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

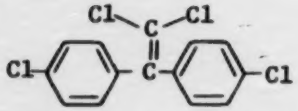
Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
440	DDE		roof of Taft Center, Cincinnati, Ohio (rainwater)	0.2 mg/1	
439			Connecticut R., Northfield, Mass.	presumptive	Sept. 1964
			Hudson R., Poughkeepsie, N.Y.	0.004 ug/1	"
			St. Lawrence R., Massena, N.Y.	presumptive	"
			Delaware R., Martin's Creek, Pa.	0.008 ug/1	"
			Potomac R., Great Falls, Md.	presumptive	"
			Shenandoah R., Berryville, Va.	0.002 ug/1	"
			Savannah R., Port Wentworth, Ga.	0.004 ug/1	"
			N. Augusta, S.C.	presumptive	"
			Tennessee R., Bridgeport, Ala.	"	"
			Kanawha R., Winfield Dam, W. Va.	"	"
			Monongahela R., Pittsburgh, Pa.	0.004 ug/1	"
			Maumee R., Toledo, Ohio	0.015 ug/1	"
			Mississippi R., Burlington, Iowa	presumptive	"
			Lock & Dam 3, St. Paul, Minn.	0.011 ug/1	"
			Rainy R., Baudette, Minn.	presumptive	"
			Red R. (N), Grand Forks, N.D.	0.004 ug/1	"
			St. Clair R., Port Huron, Mich.	presumptive	"
			Lake Superior, Duluth, Minn.	"	"
			Big Horn R., Hardin, Mont.	"	"
			Missouri R., Yankton, S.D.	0.004 ug/1	"

TABLE I (CONT). - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
439	DDE (cont.)		Missouri R., Bismarck, N.D.	0.003 ug/1	Sept. 1964
			Platte R., Plattsmouth, Nebr.	0.004 ug/1	"
			S. Platte R., Julesburg, Colo. (N. channel)	0.018 ug/1	"
			Arkansas R., Little Rock, Ark.	presumptive	"
			Mississippi R., New Roads, La.	presumptive	"
			Vicksburg, Miss.	"	"
			W. Memphis, Ark.	0.007 ug/1	"
			Atchafalaya R., Morgan City, La.	0.003 ug/1	"
			Colorado R., Yuma, Ariz.	0.004 ug/1	"
			Green R., Dutch John, Utah	presumptive	"
			Rio Grande, Brownsville, Tex.	"	"
			Alamosa, Colo.	"	"
			Columbia R., Clatskanie, Ore.	0.005 ug/1	"
			Pasco, Wash.	presumptive	"
			Snake R., Wawawai, Wash.	"	"
			Payette, Idaho	0.005 ug/1	"
			San Joaquin R., Vernalis, Calif.	0.005 ug/1	"
			Bear R., Preston, Idaho	0.011 ug/1	"
			Arkansas R., John Martin Reservoir, Colo.	0.005 ug/1	Oct. 1965
				0.005 ug/1	May 1966
				0.015 ug/1	July 1966
			van Buren, Ark.	0.020 ug/1	Oct. 1965
				0.005 ug/1	March 1966

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
42	DDE (cont.)		Brazos R., Richmond, Tex.	0.005 ug/1	April 1966
				0.010 ug/1	Aug. 1966
			Colorado R., Wharton, Tex.	0.015 ug/1	April 1966
				0.005 ug/1	May 1966
			Rio Grande, Anzalduas Dam, Tex.	0.005 ug/1*	Oct. 1965
				0.005 ug/1*	Feb. 1966
				0.010 ug/1*	May 1966
				0.010 ug/1*	Aug. 1966
			Colorado R., Yuma, Ariz.	0.005 ug/1*	May 1966
				0.010 ug/1*	June 1966
			Yakima R., Kiona, Wash.	0.010 ug/1*	April 1966
				0.010 ug/1*	May 1966
				0.015 ug/1*	July 1966
269		commercial orchard amount pesticide applied not determined 1963-65	Knight's Creek, Dunn County, Wis.		June 1966
139			Hudson R., Poughkeepsie, N.Y.	presumptive	Sept. 1966
			Narrows, N.Y.	"	"
			Tennessee R., Bridgeport, Ala.	"	"
			St. Lawrence R., Massena, N.Y.	0.002 ug/1	"
			Lake Superior, Duluth, Minn.	presumptive	"
			Arkansas R., Pendleton Ferry, Ark.	"	"
			Brazos R., Arcola, Tex.	0.004 ug/1	"
			Red R., Alexandria, La.	presumptive	"

* sample taken monthly.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

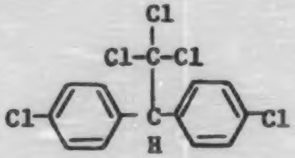
Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
139	DDE (cont.)		Rio Grande, El Paso, Tex.	presumptive	Sept. 1966
			San Joaquin R., Vernalis, Calif.	0.003 ug/1	"
			Columbia R., Clatskanie, Ore.	0.001 ug/1	"
37			Rainy R., Baudette, Minn.	presumptive	Sept. 1965
			Detroit R., Detroit, Mich.	0.008 ug/1	"
			Platte R., Plattsmouth, Nebr.	presumptive	"
			Yellowstone R., Sidney, Mont.	0.002 ug/1	"
			San Juan R., Shiprock, N. Mex.	0.009 ug/1	"
			Delaware R., Philadelphia, Pa.	0.012 ug/1	"
			Mississippi R., Vicksburg, Miss.	0.011 ug/1	CAM samples top ten 1958-65
			Hudson R., Poughkeepsie, N.Y.	0.006 ug/1	"
			S. Platte R., Julesburg, Colo.	0.005 ug/1	"
			Mississippi R., N. Orleans, La.	0.004 ug/1	"
			Rio Grande, Brownsville, Tex.	0.004 ug/1	"
			Laredo, Tex.	0.004 ug/1	"
			Lake Superior, Duluth, Minn.	0.004 ug/1	"
			12 stations in various river basins	0.002 ug/1	"
448			samples from 100 locations in U.S.	0.000-0.018 ug/1	"
259			Seneca R.	0.011 ug/1	Sept. 1965
			Lake Champlain	0.011 ug/1	Oct. 1965

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
240	DDE (cont.)		Missouri R., Nebraska City, Nebr.	0.01 ug/l	May 1967
			Arkansas R., van Buren, Ark.	0.01 ug/l*	April 1967
				0.01 ug/l*	May 1967
			Brazos R., Richmond, Tex.	0.01 ug/l*	Nov. 1966
				0.01 ug/l*	May 1967
				0.06 ug/l*	June 1967
				0.01 ug/l*	Oct. 1967
				0.01 ug/l*	Dec. 1967
				0.02 ug/l*	Jan. 1968
				0.01 ug/l*	March 1968
				0.02 ug/l*	May 1968
				0.01 ug/l*	July 1968
				0.01 ug/l*	Sept. 1968
			Colorado R., Wharton, Tex.	0.01 ug/l*	June 1967
				0.02 ug/l*	Jan. 1968
				0.01 ug/l*	March 1968
				0.01 ug/l*	April 1968
				0.01 ug/l*	July 1968
				0.01 ug/l*	Aug. 1968
			Rio Grande, Ansalduas Dam, Tex.	0.01 ug/l*	Feb. 1967
				0.01 ug/l*	March 1967
				0.01 ug/l*	June 1967
				0.02 ug/l*	Oct. 1967
				0.01 ug/l*	Nov. 1967
				0.01 ug/l*	Dec. 1967
				0.01 ug/l*	May 1968
				0.01 ug/l*	Sept. 1968
			Gila R., Gillespie Dam, Ariz.	0.03 ug/l*	Nov. 1967
				0.03 ug/l*	Dec. 1967

* samples taken monthly for 1-2 years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
240	DDE (cont.)		Gila R., Gillespie Dam, Ariz.	0.01 ug/1*	Jan. 1968
				0.03 ug/1*	Feb. 1968
				0.02 ug/1*	March 1968
				0.04 ug/1*	May 1968
				0.03 ug/1*	June 1968
				0.05 ug/1*	July 1968
				0.03 ug/1*	Sept. 1968
			Sacramento R., Verona, Calif.	0.01 ug/1*	May 1968
			Yakima R., Kiona, Wash.	0.01 ug/1*	Feb. 1967
				0.03 ug/1*	June 1967
				0.01 ug/1*	Oct. 1967
				0.02 ug/1*	Dec. 1967
				0.01 ug/1*	Jan. 1968
				0.01 ug/1*	Feb. 1968
				0.01 ug/1*	May 1968
				0.02 ug/1*	June 1968
				0.01 ug/1*	July 1968
				0.01 ug/1*	Aug. 1968
			Columbia R., Dalles, Ore.	0.01 ug/1*	Nov. 1967
69	DDT		Mississippi R., Quincy, Ill.	1-20 ug/1	
440		rainwater	run off	0.02-0.06 ug/1	
			roof of Taft Center, Cincinnati, Ohio	1.2 ug/1	
436		mosquito control	48 areas Salt Lake County, Utah rivers, creeks, canals, ditches, drainage areas, etc.	1.4-4.6 ug/1 0.6-2.8 ug/1	March 1965
433			Angara	0.005-0.04 mg/1	

* samples taken monthly for 1-2 years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
280	DDT (cont.)		Ukranian water reservoirs	0.01-0.04 mg/l 0.02-0.07 mg/l traces - 0.03 mg/l 1.6-3.4 mg/l	
290			rivers in U.S.	0.001-0.2 mg/l	
17			Sabago Lake, Maine		
445		0.5 lb/acre	Boulder R. drainage area, Mont.	0.02 mg/l	
439			Connecticut R., Northfield, Mass.	presumptive	Sept. 1964
			Potomac R., Great Falls, Md.	"	"
			Shenandoah R., Berryville, Pa.	0.026 ug/l	"
			Susquehanna R., Sayre, Pa.	presumptive	"
			Apalachicola R., Chattahoochee, Fla.	0.027 ug/l	"
			Chattahoochee R., Lanett, Ala.	0.007 ug/l	"
			Savannah R., Port Wentworth, Ga.	0.020 ug/l	"
			Clinch R., Kingston, Tenn.	presumptive	"
			Tennessee R., Bridgeport, Ala.	"	"
			Kanawha R., Winfield Dam, W. Va.	0.017 ug/l	"
			Monongahela R., Pittsburgh, Pa.	0.018 ug/l	"
			Wabash R., New Harmony, Ind.	presumptive	"
			Maumee R., Toledo, Ohio	0.087 ug/l	"
			Mississippi R., Burlington, Iowa	presumptive	"
			Lock & Dam 3, St. Paul, Minn.	"	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
439	DDT (cont.)		Rainy R., Baudette, Minn.	presumptive	Sept. 1964
			Red R. (N), Grand Forks, N.D.	0.072 ug/1	"
			Lake Michigan, Milwaukee, Wis.	presumptive	"
			Lake Superior, Duluth, Minn.	"	"
			Missouri R., Yankton, S.D.	0.024 ug/1	"
			Bismarck, N.D.	0.014 ug/1	"
			Platte R., Plattsmouth, Nebr.	0.019 ug/1	"
			Arkansas R., Little Rock, Ark.	presumptive	"
			Mississippi R., New Roads, La.	"	"
			Vicksburg, Miss.	0.041 ug/1	"
			Red R. (S), Alexandria, La.	0.031 ug/1	"
			Atchafalaya R., Morgan City, La.	0.047 ug/1	"
			Colorado R., Yuma, Ariz.	0.021 ug/1	"
			Loma, Colo.	presumptive	"
			Green R., Dutch John, Utah	"	"
			Rio Grande, Brownsville, Tex.	0.025 ug/1	"
			Alamosa, Colo.	presumptive	"
			Clearwater R., Lewiston, Idaho	0.012 ug/1	"
			Columbia R., Clatskanie, Ore.	0.034 ug/1	"
			Pasco, Utah	presumptive	"
			Pend Oreille R., Albeni Falls Dam, Idaho	"	"
			Snake R., Wawawai, Wash.	0.014 ug/1	"
			Payette, Idaho	presumptive	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
439	DDT (cont.)		Willamette R., Portland, Ore.	0.029 ug/l	Sept. 1964
			Klamath R., Keno, Ore.	0.016 ug/l	"
			Sacremento R., Green's Landing, Calif.	presumptive	"
			San Joaquin R., Vernalis, Calif.	0.066 ug/l	"
			Bear R., Preston, Idaho	0.034 ug/l	"
369			Detroit, Missouri & Mississippi Rivers	0.001-0.2 mg/l	"
42		agricultural	Missouri R. at Nebraska	0.050 ug/l	May 1966
				0.045 ug/l	Sept. 1966
			Arkansas R., John Martin Reservoir, Colo.	0.075 ug/l	May 1966
			van Buren, Ark.	0.070 ug/l	July 1966
				0.110 ug/l	Aug. 1966
			Brazos R., Richmond, Tex.	0.055 ug/l	May 1966
				0.045 ug/l	June 1966
				0.105 ug/l	Aug. 1966
			Colorado R., Wharton, Tex.	0.025 ug/l	Oct. 1965
				0.070 ug/l	April 1966
			Rio Grande, Anzalduas, Tex.	0.050 ug/l	July 1966
			Colorado R., Yuma, Ariz.	0.070 ug/l	March 1966
			Yakima R., Kiona, Wash.	0.065 ug/l	Aug. 1966
			Snake R., King Hill, Idaho	0.060 ug/l	July 1966
128		1 lb/acre watersheds in Pa.	nearby streams		

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
139	DDT (cont.)		Hudson R., Poughkeepsie, N.Y.	0.005 ug/l	Sept. 1966
			Narrows, N.Y.	0.007 ug/l	"
			Delaware R., Trenton, N.J.	0.028 ug/l	"
			Potomac R., Great Falls, Md.	0.038 ug/l	"
			Susquehanna R., Sayre, Pa.	0.010 ug/l	"
			Neuse R., Raleigh, N.C.	presumptive	"
			Escambia R., Century, Fla.	"	"
			Tennessee R., Bridgeport, Ala.	"	"
			Ohio R., Cairo, Ill.	0.020 ug/l	"
			Wabash R., Lafayette, Ind.	0.007 ug/l	"
			Lake Superior, Duluth, Minn.	0.026 ug/l	"
			Missouri R., Kansas City, Kans.	0.029 ug/l	"
			Bismarck, N.D.	0.013 ug/l	"
			Platte R., Plattsmouth, Nebr.	0.023 ug/l	"
			Rainy R., Beaudette, Minn.	0.015 ug/l	"
			Arkansas R., Pendleton Ferry, Ark.	0.042 ug/l	"
			Coolidge, Kans.	presumptive	"
			Brazos R., Arcola, Tex.	0.123 ug/l	"
			Mississippi R., Vicksburg, Miss.	0.044 ug/l	"
			Delta, La.	0.031 ug/l	"
			Rio Grande, Brownsville, Tex.	presumptive	"
			El Paso, Tex.	0.046 ug/l	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
139	DDT (cont.)				
			Colorado R., Page, Ariz.	presumptive	Sept. 1966
			Kiikii Stream, Oahu, Hawaii	0.013 ug/l	"
			San Joaquin R., Vernalis, Calif.	0.007 ug/l	"
			Waikele Stream, Oahu, Hawaii	0.013 ug/l	"
			Pend Oreille R., Albeni Falls Dam, Idaho	presumptive	"
			Snake R., American Falls, Idaho	0.025 ug/l	"
			Willamette R., Portland, Ore.	0.018 ug/l	"
147			large U.S. rivers	0.02 mg/l	"
102			Lake St. Clair, Ont., Detroit R.	1-20 ug/l	1953
			Mississippi & Missouri rivers	1-20 ug/l	1957
37			Chattahoochee R., Lanett, Ala.	0.017 ug/l	Sept. 1965
			Escambia R., Century, Fla.	0.017 ug/l	"
			Savannah R., Port Wentworth, Ga.	0.016 ug/l	"
			Clinch R., Kingston, Tenn.	presumptive	"
			Tennessee R., Bridgeport, Ala.	0.015 ug/l	"
			Allegheny R., Pittsburgh, Pa.	0.004 ug/l	"
			Monongahela R., Pittsburgh, Pa.	0.016 ug/l	"
			Ohio R., Cairo, Ill.	0.023 ug/l	"
			Addison, Ohio	presumptive	"
			Wabash R., New Harmony, Ind.	0.012 ug/l	"
			Illinois R., Peoria, Ill.	presumptive	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
37	DDT (cont.)		Mississippi R., E. St. Louis, Ill.	presumptive	Sept. 1965
			Red R. (N), Grand Forks, N.D.	0.034 ug/1	"
			Missouri R., St. Louis, Mo.	0.016 ug/1	"
			N. Platte R., Henry, Nebr.	0.039 ug/1	"
			S. Platte R., Julesburg, Colo.	0.023 ug/1	"
			Yellowstone R., Sidney, Mont.	0.002 ug/1	"
			Mississippi R., Vicksburg, Miss.	0.017 ug/1	"
			Delta, La.	0.019 ug/1	"
			Colorado R., Page, Ariz.	0.058 ug/1	"
			San Juan R., Shiprock, N. Mex.	0.125 ug/1	"
			Rio Grande, El Paso, Tex.	0.012 ug/1	"
			Alamosa, Colo.	0.149 ug/1	"
			Spokane R., Post Falls Dam, Idaho	0.037 ug/1	"
			Truckee R., Farad, Calif. (Nevada border)	presumptive	"
			Rio Grande, Brownsville, Tex.	0.144 ug/1	top ten
			Laredo, Tex.	0.052 ug/1	CAM samples
			El Paso, Tex.	0.032 ug/1	1958-1965
			Ohio R., Cairo, Ill.	0.023 ug/1	"
			Mississippi R., New Orleans, La.	0.019 ug/1	"
			Delaware R., Philadelphia, Pa.	0.015 ug/1	"
			Chattahoochee R., Lanett, Ala.	0.011 ug/1	"

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
37	DDT (cont.)		Tennessee R., Pickwick Landing, Tenn.	0.011 ug/l	1958-65
			Mississippi R., Vicksburg, Miss.	0.010 ug/l	"
			Sacramento R., Green's Landing Calif.	0.009 ug/l	"
			Tombigbee R., Columbus, Miss.	0.009 ug/l	"
448			analysis of water at 100 locations across U.S.	0.000-0.087 ug/l	"
240			Missouri R., Nebraska City, Nebr.	0.01 ug/l*	April 1967
				0.01 ug/l*	Dec. 1967
				0.09 ug/l*	May 1968
			Platte R., Brady, Nebr.	0.01 ug/l*	Jan. 1968
			Arkansas R., John Martin Reservoir, Colo.	0.01 ug/l*	Oct. 1967
				0.01 ug/l*	Dec. 1967
				0.04 ug/l*	July 1968
			van Buren, Ark.	0.01 ug/l*	April 1967
				0.01 ug/l*	Nov. 1967
				0.01 ug/l*	Dec. 1967
				0.01 ug/l*	Sept. 1968
			Canadian R., Whitefield, Okla.	0.01 ug/l*	Dec. 1967
				0.01 ug/l*	Jan. 1968
				0.01 ug/l*	Sept. 1968
			Brazos R., Richmond, Tex.	0.08 ug/l*	Nov. 1966
				0.07 ug/l*	Dec. 1966
				0.01 ug/l*	May 1967

* samples taken monthly for two years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
240	DDT (cont.)		Brazos R., Richmond, Tex.	0.06 ug/1*	June 1967
				0.01 ug/1*	Oct. 1967
				0.01 ug/1*	Dec. 1967
				0.04 ug/1*	Jan. 1968
				0.01 ug/1*	March 1968
				0.02 ug/1*	July 1968
				0.01 ug/1*	Sept. 1968
			Colorado R., Wharton, Tex.	0.03 ug/1*	June 1967
				0.04 ug/1*	Oct. 1967
				0.01 ug/1*	Nov. 1967
				0.12 ug/1*	Jan. 1968
				0.03 ug/1*	Feb. 1968
				0.05 ug/1*	March 1968
				0.04 ug/1*	April 1968
				0.09 ug/1*	May 1968
				0.02 ug/1*	July 1968
				0.01 ug/1*	Aug. 1968
			Rio Grande, Anzalduas Dam, Tex.	0.01 ug/1*	Oct. 1967
				0.01 ug/1*	Nov. 1967
				0.01 ug/1*	Dec. 1967
			Colorado R., Yuma, Ariz.	0.01 ug/1*	Nov. 1967
				0.01 ug/1*	Jan. 1968
			Green R., Green River, Utah	0.01 ug/1*	Nov. 1967
				0.01 ug.1*	Jan. 1968
			Gila R., Gillespie Dam, Ariz.	0.03 ug/1*	Nov. 1967
				0.07 ug/1*	Dec. 1967
				0.01 ug/1*	Jan. 1968
				0.01 ug/1*	March 1968
				0.01 ug/1*	May 1968
				0.03 ug/1*	July 1968
				0.04 ug/1*	Sept. 1968

* samples taken monthly for two years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

Ref	Agent	Source	Location	Concentration	
			AROMATIC DERIVATIVES		
240	DDT (cont.)		Humboldt R., Rye Patch, Nev.	0.06 ug/1*	Jan 1968
				0.02 ug/1*	March 1968
			Sacramento R., Verona, Calif.	0.01 ug/1*	Oct. 1967
				0.01 ug/1*	Nov. 1967
				0.01 ug/1*	Dec. 1967
				0.01 ug/1*	Jan. 1968
				0.05 ug/1*	May 1968
				0.02 ug/1*	July 1968
			Feather R., Oroville, Calif.	0.01 ug/1*	Oct. 1967
				0.01 ug/1*	Jan. 1968
				0.01 ug/1*	March 1968
			Yakima R., Kiona, Wash.	0.02 ug/1*	April 1967
				0.03 ug/1*	June 1967
				0.01 ug/1*	Oct. 1967
				0.01 ug/1*	Nov. 1967
				0.01 ug/1*	Dec. 1967
				0.01 ug/1*	Jan. 1968
				0.01 ug/1*	Feb. 1968
				0.01 ug/1*	March 1968
				0.03 ug/1*	April 1968
				0.03 ug/1*	May 1968
				0.02 ug/1*	June 1968
				0.02 ug/1*	July 1968
				0.02 ug/1*	Aug. 1968
			Snake R., King Hill, Idaho	0.02 ug/1*	Oct. 1967
				0.01 ug/1*	Dec. 1967
				0.01 ug/1*	Jan. 1968
				0.02 ug/1*	Oct. 1968
			Columbia R., Dalles, Ore.	0.01 ug/1*	June 1967
				0.01 ug/1*	Nov. 1967
				0.01 ug/1*	Jan. 1968
				0.01 ug/1*	May 1968

* samples taken monthly 1-2 years.

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

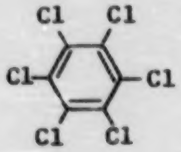
Ref	Agent	Source	Location	Concentration
			AROMATIC DERIVATIVES	
432	DDT (cont.)		U.S.S.R.: open bodies of water	0.0005-0.002 mg/1
			water supply sources	0.0003-0.0005 mg/1
24	DDT AND ANALOGUES	municipal and agricultural	streams in Louisiana, Missisaippi and Arkansas	1966
		formulation wastes and/or agricultural	Coldwater Creek, Mississippi Bear Creek, Mississippi	1964,66
38		applied to foliage, soil water courses	Susquehanna R., Conowingo, Md.	1962
			Delaware R., Philadelphia, Pa.	"
			Chattahoochee R., Lanett, Ala.	"
			Tennessee R., Pickwick Ldg., Tenn.	"
			Rio Grande, El Paso, Tex.	"
			Brownsville, Tex.	"
			San Joaquin R., Vernalis, Calif.	"
			Sacramento R., Green's Landing, Calif.	"
			Yakima R., Richland, Wash.	"
			Columbia R., Northport, Wash.	"
			Wenatchee, Wash.	"
			Pasco, Wash.	"
			McNary Dam, Ore.	"
432	HEXACHLORANE (HCB)  		U.S.S.R.: open bodies of water	0.0008-0.003 mg/1
			water supply sources	0.0004 mg/1

TABLE I (CONT.) - CONCENTRATION OF ORGANIC POLLUTANTS IN WATER

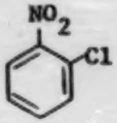
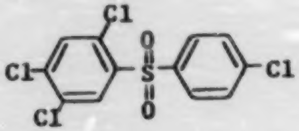
Ref	Agent	Source	Location	Concentration
		AROMATIC DERIVATIVES		
261	NITROCHLOROBENZENE	industrial waste	Cape Girardeau, Mo. (Mississippi R.)	37 mg/l
		dye chemistry	Mississippi R., New Orleans, La.	1-2 mg/l
		MERCAPTANS AND OTHER SULFUR ORGANICS		
259	TEDION (Tetradifon) 	pesticide	Niagara R.	0.11 mg/l Aug. 1964
		ORGANOMETALLICS		
169	METHYLMERCURIC CHLORIDE	acetaldehyde plant	Minamata Bay, Japan	9-85 mg Hg/kg/dry weight of fish 1960-1963
413	CH_3HgCl	acetaldehyde plant	Agano R., Japan	14.4 mg/l 5km from mouth of the river 1965
1		industrial waste	Lake Erie	found
			Great Lakes, Canada	5 mg/l in fish
		used as seed dressing	Lakes and streams in Southern and Central Sweden	found

TABLE II - MAMMALIAN ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS FOUND IN FRESH WATER

This table contains acute and chronic toxicological information on chemicals found in water presented in Table I. LD_{50} in mammals form the highest proportion of the acute toxicity information available and data on non-mammalian species (fish and birds were included only if toxicity information on mammals was not available or was scant.) Included under the LD_{50} column was data available on humans at doses where fatalities can occur and are estimates only. These are essentially LD_{100} data. All doses are oral unless otherwise indicated where oral information was not available. Large gaps of information exist for chronic toxicity and the greatest proportion of chronic toxicological data presented in this table came from the Russian literature. The doses presented for chronic toxicity are those which elicited an effect and where this was not available the doses used are presented. The chronic toxicity effects varied according to what was looked for. The Russian data included changes in conditioned behavior and little information was available on how the data was obtained or treated.

TABLE II - MAMMALIAN ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS FOUND IN FRESH WATER

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES					
UNSUBSTITUTED									
METHANE	252	sunfish	not toxic						
		fathead	not toxic at 65mg/1 after 2 hrs						
HALOGENATED									
ALDRIN	252	human	5000 (fatal)						
	338	rat	50			48	rat	100 mg/kg daily	Gradual increase in esterase levels
	124		39 ♂						
			60♀					10-12.5 mg/kg daily	Effects on reproduction
			98 (dermal)						
	293		67			48	laboratory animals	5 mg/1	Change in rate of weight gain and CNS
	451		45-60						
	252		39-66						
	449		42						
	173		40-60						
	252	chick	25						
		bobwhite quail	4						
		ringneck pheasant	14						
		mourning dove	15-17						

LD_{50} - dose at which 50% of animals died.

96 hr TLm - concentration at which 50% of fish died in 96 hrs (or other time indicated).

LC_{50} - concentration at which 50% of fish died in 24 hrs.

TABLE II (CONT.) :- ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES					
ALDRIN (cont.)	101,174,252	guppy		0.033					
	449	fathead		0.028					
	101			0.033					
	101,449	goldfish		0.028					
	338	fish		0.024					
	431,438			0.02					
	431	D. magna		0.01					
	449	rainbow trout			0.14				
	174,252,449	bluegill		0.033 0.013					
BHC	252	rat	600 200						
		bobwhite quail	250						
		ringneck pheasant	450						
	338	fish		2.0					
		trout		3.0					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref·	Species	Dose	Effect
				ALKANES AND ALKENES					
BHC (cont.)	101,449	fathead		2.3					
	101,442,449	bluegill		0.079					
	101,449	goldfish		2.3					
		guppy		2.17					
β-ISOMER BHC	252	rat	6000						
CHLORDANE	252	human	100 (fatal)			444	rat	1-5 mg/kg daily for 7 days	Inhibition of steroid activity
	338	rat	500						
	293		355						
	49		490			252	bird		Decrease in reproduction
	340		225-590						
	451		450-500						
	452		355-590						
	173		283						
	124		530 (dermal)						
	252	bobwhite quail	250						
		ringneck pheasant	500						
	338	fish		0.69					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES					
CHLORDANE (cont.)	174	channelcat		0.5					
	101,449	fathead		0.052					
	252			0.052-0.069					
	101,252	goldfish		0.082					
	101,174,252	guppy		0.19					
	101.252,442	bluegill		0.022					
	449				0.054				
		rainbow trout			0.022				
DIELDRIN	252	human	5000 (fatal)			444	rat	purified substance 4 days I.P.	Stimulated activity of liver microsomal enzymes that metabolize estrone; inhibited the estrone-induced increase in uterine wet weight and decreased the amount of tritiated estrogen found in the uterus after an injection of tritiated estrone
	338,340	rat	60						
	126,293		46						
	173		40						
	240		37-67						
	449		40						
	451		60-90						
	49		142 (18.6% active substance)						
	338	fish		0.016					
	252			0.005-0.042					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ALKANES AND ALKENES					
DIELDRIN (cont.)	174,252,442, 449	bluegill		0.0079		311	human	0-0.211 mg/d.	No ill effects
	174,252	channel cat		< 2.5		434	Japanese quail	10 mg/kg	Affected reproduction
	101,174,252, 449	fathead		0.016					
		goldfish		0.037					
		guppy		0.022					
ENDOSULFAN	124	rat	43♂						
			18♀						
			130 ♂) 74 ♀) (dermal)						
	252		90						
			110						
	366		30						
	173		35						
ENDRIN	338	rat	5-45			67	catfish		Inhibition of electron transport enzymes and cholinesterases
	124		18 ♂						
			7.5 ♀						
			18 ♂) 15 ♀) (dermal)			270	warmblooded animals	0.0003 mg/g	Threshold concentration in blood
	173		3-6						
	293		17.8						
	451		10-12						
	252		7.3-48						

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ALKANES AND ALKENES					
ENDRIN (cont.)	252	monkey	3			295	fish		No change in proline levels in blood, brain, muscle, gills or liver; can tolerate many times TLm as accumulation in fat
		rabbit	7-10						
		guinea pig	36 ♂ 16 ♀						
						90	cockroach		Blood and body proline decreased markedly
		chick	3.5						
	338	fish		0.0013		252	dog	4 mg/kg daily in diet	Abnormal effects
	174,251,252, 449	goldfish		0.0019					
	174	coho salmon		0.0005			quail	1 mg/kg in diet	40% decrease in reproduction
	174,251,438, 449	fathead		0.001 0.001-0.0013					
	174,252,442, 449	bluegill		0.0006	0.0007				
	174,252,449	guppy		0.0015					
	449	rainbow trout			0.0008				

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES					
HEPTACHLOR	252,338,340	rat	90			444	rat	purified, I.P., 4 days	Stimulated the activity of liver microsomal enzymes that metabolize estrone; inhibited the estrone-induced increase in uterine wet weight and decreased the amount of tritiated estrogen found in the uterus after an injection of tritiated estrone
	124		100 ♂ 162 ♀ 195 ♂) (dermal) 250 ♀)						
	293		100						
	451 451		90-130						
	173 173		40						
	338 338	fish		0.056					
	174,251,252	bluegill		0.019					
	174,252	catfish		0.175		54	rat	>0.0025 mg/kg daily	Changes in physiological and biochemical activities of the organism
	101,174,252, 449	fathead		0.094					
		goldfish		0.23					
		guppy		0.25 0.107					
	252	red-sided shiner		0.096-0.11					
ISODRIN	252	rat	7-42						
	449		10						
	173		7-17						
	252	rabbit	5-7						
		chick	2.7						

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ALKANES AND ALKENES					
LINDANE	338,340,351	rat	125			444	rat	purified, I.P. for 4 days	Stimulated the activity of liver microsomal enzymes that metabolize estrone; inhibited the estrone-induced increase in uterine wet weight and decreased the amount of tritiated estrogen found in the uterus after an injection of tritiated estrone
	49		107						
	124		88 ♂						
			91 ♀						
			1000 ♂) (dermal) 900 ♀)						
	173		200						
	252	bobwhite quail	120-130 ♂ 190-210 ♀						
		ringneck pheasant	60-100						
		mourning dove	350-400						
	338	fish		0.056					
	101,174,252, 449	bluegill		0.077	0.061				
		fathead		0.062 0.063					
		goldfish		0.152					
		guppy		0.138					
	449	rainbow trout			0.030				

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES					
TOXAPHENE	252	human	5000 (fatal)			252	dog	4 mg/kg daily	Loss of weight; abnormal behavior
	338	rat	40						
	124		90 ♂ 80 ♀ 1075 ♂) (dermal) 780 ♀)						
	293		90						
	340		69						
	451		60-100						
	252		69-90						
	49		123						
	173		283						
	338	fish		0.0051					
	101,174,449	bluegill		0.0035					
	252	fathead		0.0051					
	101,			0.0075					
	101,251,252, 449	goldfish		0.0056					
	101,174,252, 449	guppy		0.020 0.043					
	252	trout (fingerling)		0.0135 0.0165					
	252	rainbow trout		0.0145 0.0165					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AMINES					
ALIPHATIC									
DIETHYLAMINE	252	rat	540			176	rabbit	6 mg/kg/day for 7 mos	Disturbance in carbohydrate function of the liver
	176	mouse	648.6				rat	64.8 mg/kg daily for 2 1/2 mos	No appreciable cumulative properties; decrease in weight gain; increase in ascorbic acid content of the liver
	252	creek chub		85 (48 hrs)					
DIMETHYLAMINE	88,89	rat	698			89	guinea pig	107 mg/kg for 6 wks	Increase in blood hemoglobin; increased activity of blood cholinesterase
		mouse	316				rabbit	160 mg/kg for 6 wks	Increased urea content in blood serum; increase in coproporphyrin excretion in urine; increase in weight coefficient of the liver; decrease in vitamin C in organs
		guinea pig	240				guinea pig	3.5 mg/kg daily for 8 mos	Increased corproporphyrin excretion in urine; increase un urea content in serum; decrease in vitamin C content of suprarenals; increase in weight coefficient of the liver
		rabbit	240						

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				AMINES					
DIMETHYLAMINE (cont.)						89	rat	0.25 mg/kg daily for 8 mos	Retards appearance and stabilization of the positive reflex; prolongs latent period; decrease in magnitude and percentage incidence of the conditioned reflex
ETHYLAMINE	252	rat	400			117	rabbit	0.25 mg/kg daily for 6 mos	Change in albumin/globulin coefficient
		mouse	530-580						
		creek chub		40 (48 hrs)			rat	2.5 mg/kg daily for 6 mos	Change in conditioned reflexes
METHYLAMINE	252	creek chub		fatal at 30 survived at 10 for 24 hrs		328	rat	0.75 mg/kg daily for 9 mos	Change in general condition of animals; development of a lymphophenia within 2 months
							rabbit	0.5 mg/kg daily for ≥ 7 mos	Decrease in cholinesterase activity of blood

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Speices	Dose	Effect
AROMATIC				**AMINES**					
ANILINE	217	rat	750			217	rat	> 0.005 mg/kg daily	Effect on conditioned reflexes
		mouse	1075						
	252	dog	500						
		fathead		200 (toxic level)					
		goldfish		1000 " "					
		trout		1000 " "					
o-ANILINE	269	rat	1246.1			252	human		Anemia, anorexia, loss of weight, cretaneous lesion and bladder trouble
		guinea pig	2350						
						253	cat		Increase in level of methaemoglobin
m-ANILINE	269	rat	700						
		guinea pig	450						

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AMINES					
NITRILES									
2,6-DICHLOROBENZO-NITRILE	131	rat	4500			131	rat	100 mg/kg daily	Increase in liver weight
		rabbit	270					200 mg/kg daily	Increase in kidney weight
		guinea pig	2100						
	417	bluegill			22				
		trout			23				
HETEROCYCLIC									
PYRIDINE	252,435,449	mosquito fish		1300 1350		252	rat	0.125 mg/kg daily	Pathological effects
						464	warm-blooded animals	0.125 and 0.25 mg/kg daily	Failed to gain weight, change in prothrombin time, slight histological changes in the liver

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ORGANIC ACIDS					
CARBOXYLIC									
ACETIC ACID	252	rat	3310						
		mouse	4960						
		bluegill		75					
	170	goldfish		100 423 (toxic dose)					
	252,435	mosquito fish		251					
	435	creek chub		100-200					
BUTYRIC ACID	252	rat	8790						
	88	D. magna		61 (48 hrs)					
CAPROIC ACID	88	bluegill		150-200 (48 hrs)					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ORGANIC ACIDS					
2,4-D	252	human	15,000 (MLD)			252	dog	20 mg/kg daily	Toxic
	252 173	rat	666 400-500			372	human	500g daily for 3 wks	No unfavorable effects
	252,303	mouse	375			378	rat	50 mg/kg daily for 12 mos	Slight decrease in blood catalase; slight decrease in liver glycogen concentration; no pathological changes
		rabbit	800						
	252	dog	100						
	174	bluegill		375 (48 hrs) 350 (24 hrs)		378	aquatic fauna	high conc. applied for mosquito control	No adverse effects
	174 252	largemouth bass		350 (48 hrs) 350 (24 hrs)					
FENAC	173	rat	1780-3000						
FORMIC ACID	252	dog	4000						
	88	bluegill		175 (24 hrs)					
PROPIONIC ACID	88	culex sp. larvae		>1000 (48 hrs)					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ORGANIC ACIDS					
SILVEX	252	rat	650						
	173		650-1070						
		laboratory animals	500-2000						
	252	emerald shiner		7 (72 hrs)					
	174	chinook salmon		136 (24 hrs)					
2,4,5-T	252	human	54,000 (toxic)						
	173	rat	300 300-800						
VALERIC ACID	88	D. magna		45 (48 hrs)					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ORGANIC ACIDS					
SULFONICS						266	bluegill	5-6 mg/l	Histological changes
ABS	81 397 260 153	rat	2200 1400-2500 520 300			127	rat	230 mg/kg daily for 45 days	Increase in weight of spleen, liver, and adrenal gland, increase in vitamin C content of adrenal gland; increase in cholesterol level of blood
	397	mouse	1400-2800						
		hamster	1130						
		rabbit	1730			366	trout	0.001 mg/l	Avoided water with this concentration
	405 251 252,317	bluegill		8.2 4.2-4.4 5.6				10.0 mg/l	Caused confusion; unable to distinguish
	174,251 405 252	fathead		3.5-4.5 11.3 4.6		265	D. magna	small amounts	Decreased respiration; decreased metabolism; decreased reproduction
	387	fathead eggs		12.8		323	guinea pig	2% in water for 6 mos	No alarming symptoms; no histological changes
	405	emerald shiner		7.4			pig	0.2% in food for 79 days	No effect; 99.5% eliminated within 8 days
		bluntnose minnow		7.7					
		stoneroller		6.9					
		silver jaw minnow		9.2					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ORGANIC ACIDS					
ABS (cont.)	405	rosefin shiner		9.5					
		common shiner		17.0					
		carp		18.0					
		black bull.		22.0					
tp- ABS	397	rat	520-1220						
ABS (linear)	397 260	rat	650-1260 650						
	251	bluegill fingerling		0.6-3.0					
	383	fathead		3.5					
	387	fathead (eggs)		3.4 (24 hrs)					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS					
RONNELL	124	rat	1250 ♂ 2630 ♀ >5000 (dermal)						
	340		1700						
	173		1000-3000						
	252	guinea pig	3240						
		rabbit	640						
		mouse	2140						
		dog	500						
		duck	5000						
		chicken	5000						
		turkey	500						
DEF	124	rat	233 ♂ 150 ♀ 360 ♂) (dermal) 168 ♀)						
	173		325						

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				UNSUBSTITUTED AROMATICS					
PYRENE	333	mouse	9400						
				PHENOLS AND QUINONES					
o-CRESOL	252	rat	1350						
		catfish		11.2					
	174	bluegill		55-65 (lethal in 1 hr)					
		perch		10-20 (lethal in 1 hr)					
p-CRESOL	252	rat	1800						
	174	bluegill		80-90 (lethal in 1 hr)					
		perch		10-20 (lethal in 1 hr)					
CRESOL	435 449	mosquito fish		22 24					
	449	bluegill		10.0-13.6					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHENOLS AND QUINONES					
PENTACHLOROPHENOL	124	rat	146 ♂ 175 ♀ 320 ♂) (dermal) 330 ♀)			53	human		Pyrexia, acidosis, amino aciduria, and ketonuria
	115		~90			115	rat	40 mg/kg daily	Hypohemoglobinemia; different changes in the number of erythrocytes; decrease in oxygen demand proteinuria; decrease in phagocytic activity
	252		78						
	115	mouse	250						
PENTACHLOROPHENATE, Na	252	rat	210.6			115	rat	25 mg/kg daily	Hypohemoglobinemia; different changes in the number of erythrocytes; decrease in oxygen demand; proteinuria; decrease in phagocytic activity
	115		130.0						
	115	mouse	260						
		guinea pig	170						
	252	bluegill		0.35 (48 hr)					
		channel cat		0.46					
PHENOL	252	bluegill		11.5-28.5 70-75 (lethal in 1 hr)		386	trout	any conc.	Cannot avoid waters polluted with pehnol
	449	perch		9-20 (lethal in 1 hr) 9 (lethal in 1 hr)					

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHENOLS AND QUINONES					
PHENOL (cont.)	252,435,449	mosquito fish		56		373	fish	3-5 mg/l >10 mg/l > 16 mg/l	Change in behavior; foaming secretion from skin; paralyzed and sank; damaged nervous system, epithelial tissue, intestines, reproductive system and blood
	252	catfish		16.7		335	fish		
PYROCATECHOL	252	rat	3890						
				AROMATIC DERIVATIVES					
HALOGENATED									
DDD	124	rat	>4000			444	rat		Affected steroid metabolism
	252		3400						
	173		400-3400			330	human		Significant increase of the mean DDD concentration was found in cases of hypertension
	252	bluegill		0.03					
	449				0.056				
	174,252	channel cat		<2.6		329	human		Highly significant elevation of pesticide concentration in cases of carcinoma of various tissues

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AROMATIC DERIVATIVES					
DDD (cont.)						156	western grebe		Inhibition of reproductive rate
DDE	124	rat	880 ♂ 1240 ♀			444	rat		Affects steroid metabolism
						330	human		Significant increase of the mean DDE concentration found in encephalomalacia, cerebral hemorrhage, carcinoma, and hypertension
						329			Highly significant elevatio of pesticide concentratio in cases of carcinoma of various tissues
						152	mallard	10&40 mg/1	Decrease in reproduction; shells 13% thinner than normal; reduced hatchability
DDT	252,338	human	250			279	rat	0.05 mg/kg daily for 6 mos	Change in phagocytic activity; decrease in ascorbic acid in suprarenals; decrease in activity of total lactic
	124	rat	217						
	293		113						
	151,451		250						
	173		300-500						
	151		728 (dermal)						

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AROMATIC DERIVATIVES					
DDT (cont.)	279 252	mouse	580 150			279			and succinic dehydrases in hepatic tissue; change in conditioned reflexes; histological changes in liver, kidneys, myocardium, suprarenals and brain
	252	chicken	1300						
	338	fish		0.034					
	101,174,252 449	bluegill		0.016	0.007				Affects steroid metabolism
	101,174,252 383	fathead		0.032 0.0155		302	rat	200 mg/kg daily	Increase in ringtail
	174,252,449 251	goldfish		0.027 0.028					May have effect on reproduction in the case of marginal fertility
	101,174,252	guppy		0.043		443			Increase in uterine weight
	174	channel cat		>1.0		330	human		Significant elevated concentrations in brain and adipose tissue in cases of hypertension
	252 449	rainbow trout		0.0237-0.074	0.008	311	warmblooded animals	3.5 & 35 mg/day for 21 mos	No ill effects up to 27 mos after study
	18,416	goldfish		1.0 (loss of balance)					
						298	poultry	20 mg/kg for 10 wks	No effect on reproduction
								1000 mg/kg for 10 wks	Reduced egg production and hatchability

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				AROMATIC DERIVATIVES					
DDT (cont.)						152	mallard	25 mg/l	Significant thinning of shells; reduced duckling survival by 35%
						324	fish	6.2 mg/l (whole body conc.)	No physiological stress
						30	Japanese quail	100 ppm for 45 days	Decrease in eggshell Ca
						402	mouse	0.4-0.7 mg/kg for 5 generations	Leucocytosis
NITROCHLOROBENZENE	58	rabbit	520			58	rabbit	0.5 mg/kg at least 4 mos	Slight delay in the decreas of the agglutination titer; change in phagocytic activity of leucocytes
						144	rat	0.025 mg/kg daily for 8-9 mos	Change in conditioned reflexes

TABLE II (CONT.) - ACUTE AND CHRONIC TOXICITY OF ORGANIC POLLUTANTS

Agent	Acute Toxicity					Chronic Toxicity			
	Ref	Species	Oral LD50 mg/kg	96 hr. TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ORGANOMETALICS					
METHYLMERCURIC CHLORIDE	169	cat	10-50 (as Hg/kg) LD 20 (most ofted LD)			169	cat	1 mg/kg/day	Clumsiness in walking, unsteady movements, ataxic gait, dullness, tremor, blindness, paroxysmal fits (several weeks after administration)
		rat	20 (as Hg/100g) LD						
							rat	1-2 mg/100g/ day CH_3HgCl and $(CH_3Hg)_2S$	Body weight decrease. action slow, occasionally clonic cramps; symptom same as cats
						1,169, 349	human	fish from Minamata Bay	Numbness of limbs, constriction of visual field, ataxia, impairment of hearing and speech; (in severe cases unconsciousness, marked violent agitation and death)
						1,412, 413	human	fish from Agano R.	22 cases, 5 deaths;Hg found in hair of patients

TABLE III - MAMMALIAN ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER

This table contains acute and chronic toxicity of potential organic pollutants in fresh water. These chemicals are suspected to be in water because of their use for industrial, agricultural or domestic purposes or because they are known to be involved in manufacturing processes the waste products of which are likely to be discharged into fresh water. This listing is probably incomplete. As with Table II, there are gaps in our knowledge of both acute and chronic toxicity information.

TABLE III - MAMMALIAN ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
UNSUBSTITUTED					ALKANES AND ALKENES					
AMYLENE $(CH_3)_2C{=}CHCH_3$	tar and gas wastes	252 174	sunfish		lethal in 1 hr at 655-693					
BUTYLENE $CH_3CH_2CH{=}CH_2$	effluent from production of styrene rubber	252								
CYCLOHEXANE C_6H_{12} 	found in petroleum, used for solvents, for lacquers & resins or for paint remover	354	mouse	4700			354	rat	400 mg/kg for 14-40 days	Decrease in catalase activity; decrease in cholinesterase activity
		435	mosquito fish		15,000				0.05 mg/kg daily for 4 mos	Change in conditioned reflexes
CYCLOHEXENE C_6H_{10} 	petroleum, used as solvent for lacquers & resins or for paint remover	355	mouse	2300			355	white mouse	500-4000 mg/kg	Decrease in weight
								white rat	100 mg/kg during 14 days	Decrease in catalase and cholinesterase activity
								white rat	400 mg/kg during 14 days	Decrease in capacity of liver for synthesis of hippuric acid
								rabbit	0.05-0.005 mg/kg for 6 mos period	Decrease in catalase and cholinesterase activity
ETHYLENE $CH_2{=}CH_2$	manufacture of plastics, alcohol, mustard gas, ethylene oxide, & other organics	252	sunfish		lethal in 1 hr at 22-25 mg/l					

LD_{50} - dose at which 50% of animals died.

96 hr TLm - concentration at which 50% of fish died in 96 hrs (or other time indicated).

LC_{50} - concentration at which 50% of fish died in 24 hrs.

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES						
ETHYLENE (Cont'd)	effluent from production of synthetic ethyl alcohol									
HEPTANE $CH_3(CH_2)_5CH_3$	gasoline or other petroleum wastes	252 435	mosquito fish		4924					
ISOBUTYLENE $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>C=CH_2$	effluent from production of styrene rubber						13		8 mg/kg	Behavior changes & change in general condition 15-20 min after ingestion
ISOPRENE $CH_2=\overset{CH_3}{\overset{\vert}{C}}-CH=CH_2$	synthetic rubber industry						194	warm blooded animals	5 mg/1	No effect
							191	rabbit	2.5 mg/kg daily for 2 mos	Change in catalase activity
								rat	0.25 mg/kg daily	Change in conditioned reflexes
PROPYLENE $CH_3CH=CH_2$	effluent from production of synthetic ethyl alcohol									
HALOGENATED										
ALLYL CHLORIDE $CH_2=CHCH_2Cl$		179		less toxic than the alcohol						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES						
BUTANE, POLYCHLORO.	pesticide	274	white mouse	2000-2500						
$C_4Cl_xH_{10-x}$	intermediate in hexachlorobutadiene production		guinea pig	940-1400						
CARBON TETRACHLORIDE CCl_4	effluent from: manufacture of freons & tetra-chlor-alkanes, solvent in machine building, rubber & chemicopharmaceutical industries	219	albino rat	6139♂ 5650♀			219	albino rat	1/10 LD50 for 1 mo. daily	Considerable cumulative properties
		340	rat	5730-9770						
		219	white mouse	9123					15 mg/kg	Reduced content of erythrocytes, leukocytes, & hemoglobin; increase in SH groups in blood serum followed by decrease; increased activity of glutamic oxalacetic glutamic-pyruvic transminases & lactic dehydrogenase in blood serum; prolonged prothrombin time increased concentration of urea in blood serum & of coproporphyrin in the urine; disturbance of renal function; increase of vitamin C in liver & kidneys
			guinea pig	5760						
			rabbit	5760						
									1.5 mg/kg	Same effects as above; disturbance in interrelationships between the main cortical processes of inhibition and stimulation
							252	human	5 mg/1	Death
									skin (repeated contact)	Dermatitis

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

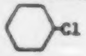
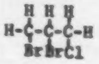
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES						
CHLOROCYCLOHEXANE 	effluent from industry producing caprolactam						300	experimental animals	0.25-25 mg/1 for 6 mos	Disturbed conditioned reflex
CHLOROFORM $CHCl_3$	solvent for fats & varnishes manufacture of alkalies & rayon	263	white mouse	1750			620	guinea pig	0.4 mg/kg	Increase in vitamin C in adrenals
			white rat	1875						
			guinea pig	1750					35 mg/kg	Decrease in blood catalase; decrease in phagocytic capacity of leukocytes; structural lesions in liver, heart muscle & stomach wall; fatty infiltration, necrobiosis, & cirrhosis of liver parenchyma, lipoid degeneration & proliferation of interstitial cells in myocardium, and acute edema of the submucous & muscular layers of the stomach
								albino rat	0.4 mg/kg	No effect
									125 mg/kg	Decrease in conditioned reflex; decrease in cholinergic activity; histological changes
							60		12.5 mg/kg	Affects conditioned reflexes by fourth month
DBCP (NEMAGON)  $H-\underset{Br}{\overset{H}{C}}-\underset{Br}{\overset{H}{C}}-\underset{Cl}{\overset{H}{C}}-H$	pesticide	174	bluegill		20 (48 hr)					
			largemouth bass		20 (48 hr)					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

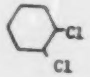
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES						
DICHLOROBUTANE $CH_3CH_2CH_2CHCl_2$	effluent from plants producing synthetic rubber from acetylene	175	rabbit cat mouse	5 mg/1 for 2 hr caused degenerative changes in all animals in bronchial epithelium 3 mg/1 for 2 hr caused purulent and necrotic pneumonia and pre-bronchitis, swelling of kidney canaliculli and irritation of hemopoietic organs			175	dog		Apathy; disturbed coordination; symptoms of paresis & paralysis; increased rate of respiration, cough, salivation, diarrhea, and progressive loss of weight
								rabbit	0.005-10 mg/kg daily for 6 mos	0.005-0.1 mg/kg: no effect 1 and 10 mg/kg: weight loss, increase in blood sugar, increase in leukocyte number, increase in pyruvic acid content of blood 10 mg/kg: liver tissue hyperemia; change in liver, kidneys, brain, lungs & testicles
DICHLOROCYCLOHEXANE 	effluent from plants manufacturing caprolactam	207	white mouse	480			207	white rat	12.5 mg/kg for 6 mos	Increase in reticulocyte number; decrease in normoblasts; other blood composition changes; wrinkling of nerve cells of brain; inflammation of liver; tissue edema in all organs; spleen capsule trabeculi and vascular walls of all organs indurated
DICHLOROETHANE $C_2H_4Cl_2$	industrial organic solvent; manufacture of tobacco extract	252	rat	770						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

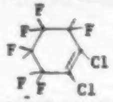
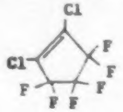
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ALKANES AND ALKENES					
1,2-DICHLOROHEXA-FLUORO-1-CYCLOHEXENE 							380	rat & rabbit	0.02 mg/kg daily	No effect on carbohydrate metabolism, SH group, or pyruvic acid blood concentrations, or conditioned reflexes; higher doses did produce morphological changes
1,2-DICHLOROHEXA-FLUORO-CYCLOPENTENE-1 	synthesis of fluorine-containing rubbers & other polymers	381	mouse	276			381	rat	28-30 mg/kg daily - 40 days	Decrease in O_2 consumption
								rabbit	28-30 mg/kg daily - 90 days	Inhibition of catalase activity; decrease in SH groups & total protein; increase in blood pyruvic acid; increase in hemoglobin, RBC & WBC; decrease in monocyte & leukocyte counts; protein dystrophy in liver; disappearance of transverse striae in cardiac muscle fibers
								rat	8.[illegible] mg/kg daily - 185 days	Decrease in O_2 consumption; decrease in conditioned reflexes; histological changes in kidney, liver & heart cells
DICHLOROMETHANE CH_2Cl_2	production of plastics & synthetic rubber used in refrigerators	414	mouse	5600			414	rat	0.4 mg/kg daily - 6 mos	Disturbance in regulatory vegetative system
								guinea pig	0.4 mg/kg daily - 5 mos	Increase ascorbic acid content of adrenals

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

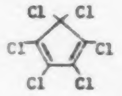
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ALKANES AND ALKENES						
ETHYLENE DIBROMIDE (BROMOFUME, EDB) $BrCH_2CH_2Br$	fumigant	340	rat	108-170						
		174	bluegill		18 (48 hr)					
			largemouth bass		15 (48 hr)					
ETHYLENE DICHLORIDE $ClCH_2CH_2Cl$	fumigant	340	rat	670-890						
FREON 253 (TRIFLUOROCHLOROPROPANE) $C_3H_4F_3Cl$		360	white mouse	62			360	rabbit & rat	5, 0.005, 0.0005 mg/kg daily for 7 mos	Weight gain; decrease in glycogenic ability of liver; increase in blood pyruvic acid; conditioned reflexes affected at higher doses
HEXACHLOROBUTADIENE $CCl_2=CCl-CCl=CCl_2$	pesticide	274	white rat	350			274, 275	guinea pig	2 mg/kg daily	Depressed phagocytic activity; increase in vitamin C content of organs; affected conditioned reflexes
			white mouse	87						
			guinea pig	90						
							275	guinea pig	2 mg/kg daily	Decrease in serum SH groups; histopathological changes in some organs
HEXACHLOROCYCLOPENTADIENE 	manufacture of heat-resistant & shock-proof plastics	284	white mouse	600			284	white rat	0.002 mg/kg daily - 6 mos	Lymphocytosis
									0.0002-0.00002 mg/kg daily - 6 mos	No changes in peripheral blood cells; ascorbic acid content, the suprarenals, conditioned reflexes, or histological structure of organs

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

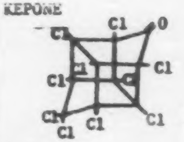
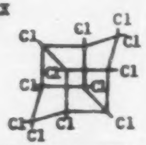
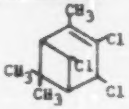
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ALKANES AND ALKENES					
HEXACHLOROETHANE Cl_3CCCl_3	basic material in organic synthesis of plastics & celluloids; pesticide	415	mouse	3100			415	rabbit	0.05 mg/kg daily	No significant effects
KEPONE 	pesticide	124	rat	125 >2000 (dermal)						
		340		95						
		173		114-140						
		40	red-ear sunfish		0.029-0.14 (variation in temperature)					
MIREX 	pesticide	124	rat	740♂ 600♀						
		340		300-600						
		124		>2,000 (dermal)						
		173		600-740						
PINENE, POLYCHLORO 	pesticide	213	rat	450			213	rabbit	10 mg/l as drinking H_2O for $\geq$ 9 wks	Change in sugar curve
			mouse	360						
STROBANE (TERPENE POLYCHLORINATES)	pesticide	340,	rat	200-500						
		449	bluegill		12					
			rainbow trout		15					
TETRACHLOROETHANE Cl_2CH-$CHCl_2$	basic material in organic synthesis of plastics & celluloids; pesticide	415	mouse	740			415	rabbit	0.25 mg/kg daily	No significant changes
									37 mg/kg daily	Change in blood sugar; pathological changes in liver and heart

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES						
TETRACHLOROETHYLENE $Cl_2C=CCl_2$	industrial compound	382	rat	8.00 (ml/kg undiluted)						
TETRACHLOROHEPTANE $Cl_2CH(CH_2)_5CHCl_2$	use in future for synthesis of polyamide fibers as emulsifiers, solvents, lacquers & heat carriers, etc.	359	laboratory animals	475			359	laboratory animals	0.03 mg/1 4-6 mos daily inhalation	Change in CNS; change in O_2 consumption; leukocytosis; thickening of lung septi; moderate protein dystrophy; swelling of reticulo endothelium
								rat	150 mg/kg daily for 3 mos	Increase in blood leukocytes; no cumulative properties
TETRACHLORONONANE $Cl_2CH(CH_2)_7CHCl_2$	use in future for synthesis of polyamide fibers as emulsifiers, solvents, lacquers & heat carriers, etc.	359	laboratory animals	920			359	laboratory animals	0.03 mg/1 4-6 mos daily inhalation	Change in CNS; change in O_2 consumption; leukocytosis; thickening of lung septi; moderate protein dystrophy; swelling of reticulo endothelium; no cumulative properties
TETRACHLOROPENTANE $Cl_2CHCH_2CH_2CH_2CHCl_2$	"	359	laboratory animals	430			359	laboratory animals	2.1 mg/1 2 mos. - inhalation	Decrease in weight; decrease in O_2 consumption; increased size & weight of liver; leukocytosis
								rat	150 mg/kg daily for 3 mos	Increase in blood leukocytes; no cumulative properties
TETRACHLOROPROPANE $Cl_2CHCH_2CHCl_2$	"	359	laboratory animals	600			359	laboratory animals	2.1 mg/1 2 mos - inhalation	Decrease in weight; decrease in O_2 consumption; increased size & weight of liver; leukocytosis
								rat	150 mg/kg daily for 3 mos	Increase in blood leukocytes; no cumulative properties

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

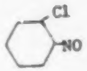
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ALKANES AND ALKENES						
TETRACHLOROUNDECANE $Cl_2CH(CH_2)_9CHCl_2$		359	laboratory animals	4300			359	laboratory animals	0.03 mg/1 4-6 mos daily inhalation	Change in CNS; change in O_2 consumption; leukocytosis; thickening of lung septi; moderate protein dystrophy; swelling of reticulo endothelium; no cumulative properties
TRICHLOROETHYLENE $ClCH{=}CCl_2$	used in dry cleaning; manufacture of chemicals & pharmaceuticals	252 264	dog mouse	5860 5900			264	test animals	300 mg/kg daily for 2 mos	Decrease in phagocytic index; no significant changes
NITRO COMPOUNDS										
CHLORONITROSOCYCLOHEXANE 	effluent from plants manufacturing caprolactam	207	white rat	384-450			207	rat	1 & 10 mg/kg	Increase in blood reticulocytes; increase in myeloerythroid proportion in bone marrow; decrease in erythropoietic cells; increase in weight of liver & spleen; degenerative necrobiotic changes
									12.5 mg/kg	All of above plus dystrophic changes
									0.1 mg/kg	Slight effect on functional state of organism
NITROCYCLOHEXANE $C_6H_{11}NO_2$							352	rat	1.5 mg/kg daily for 6 mos	Morphological changes in kidney, liver, & nervous system
NITROETHANE $CH_3CH_2NO_2$		393	rat mouse	1100 860			393	rat	0.05 mg/kg daily for 6 mos	Did not affect conditioned reflexes, thiol cholinesterase, or residual N concentration in blood, or tissue morphology

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ALKANES AND ALKENES						
NITROMETHANE CH_3NO_2		393	rat mouse	900 950			393	rat	0.05 mg/kg daily for 6 mos	Did not affect conditioned reflexes, thiol cholinesterase, or residual N concentration in blood, or tissue morphology
				ALCOHOLS						
ALLYL ALCOHOL $CH_2 = CHCH_2OH$		77	rat	64						
AMYL ALCOHOL $CH_3(CH_2)_4OH$	chemical wastes & some distilling wastes	286	human	two persons drank a mixture of butyl & amyl alcohol - state of narcosis						
		449	goldfish		10 (survival time= 94 hr $\rightarrow \infty$)					
BUTYL ALCOHOL $CH_3(CH_2)_3$-OH	wastes from paint, varnish & chemical industries	286	human	two persons drank a mixture of butyl & amyl alcohol - state of narcosis			286	cat & dog	1.85%	Reduced activity of pancreatic juice, pepsin, & trypsin
		252 77	rat	4360 2750						
1,4-BUTANEDIOL $\underset{OH}{CH_2}-(CH_2)_2\underset{OH}{CH_2}$	manufacture of polyurethanes as well as divinyl for manufacture of synthetic rubber; intermediate product of synthesis of the blood substitute polyvinyl-pyrrolidone; other industrial & agricultural effluents	197	white rat white mouse guinea pig rabbit	2062 1525 1200 2531			197	rat	30 mg/kg 6 mos study	Change in conditioned reflexes; decrease in cholinesterase activity; decrease in liver glycogen; decrease in SH groups in grey matter of brain & in whole blood; decrease in vitamin C in organs; increase in activity of blood transaminases; reduced content of nissl bodies & growth of glial elements in cerebral tissue

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

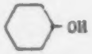
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ALCOHOLS					
1,4-BUTYNEDIOL $CH_2OHC \equiv CCH_2OH$	intermediate product in synthesis of the blood substitute polyvinyl pyrrolidone (PVP); other industrial & agricultural effluents	197	white rat	104.75			197	rat	2 mg/kg 6 mos study	Change in conditioned reflexes; decrease in cholinesterase activity; decrease in liver glycogen; decrease in SH groups in grey matter of brain & in whole blood; decrease in vitamin C in organs; increase in activity of blood serum transaminases; reduced content of nisel bodies & growth of glial elements in cerebral tissue
			white mouse	104.50						
			guinea pig	130.00						
			rabbit	150.00						
CYCLOHEXANOL 	effluent from production of caprolactam	353	mouse	1240			353	rabbit	0.2, 2.0 & 20.0 mg/kg daily for 6 mos	Change in blood sugar levels; decrease in blood catalase; pathological changes in kidneys & liver at 2.0 and 20.0 mg/kg
								rat	0.02 & 2.0 mg/kg	Significant effect on conditioned reflexes
DICHLOROHYDRIN $CH_2ClCHOHCH_2Cl$		210	mouse	93						
DIETHYLENEGLYCOL $O(CH_2CH_2OH)_2$	effluent from textile, pharmaceutical, perfumery, & tobacco industries; effluent from manufacture of synthetic resins, fabrics, plastics, & explosives	313 77	rat	15,650 20,760			314	rabbit	0.5 mg/kg daily	Affected kidney & liver function
		314	mouse	13,300				rabbit	0.5 mg/kg daily	Increase in urea & indican in blood serum; decrease in indican in urine; shortened prothrombin time; inhibited excretory hepatic function
			guinea pig	14,000						
			rabbit	2,688						
		435, 449	mosquito fish		32000			rabbit	0.05 mg/kg daily	No effect
								albino rat	0.05 mg/kg daily	No effect on conditioned reflexes

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

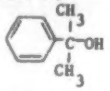
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ALCOHOLS					
DIMETHYLPHENYL-CARBINOL 	effluent from production of phenol & acetone	153	rat	2540			153	rabbit	2.5 mg/kg daily	Increase in cholinesterase activity; albuminuria; pathological changes in kidneys
			mouse	1650						
ETHYL ALCOHOL CH_3CH_2OH	used in manufacture of organic substances, perfumes, flavors, & drugs; used for beverages, fuel, paint and varnishes	252	stickle-back		40,000 caused intoxication					
ETHYLENE GLYCOL $HOCH_2CH_2OH$		313	rat	13,000			313, 314	rabbit	0.5 mg/kg daily	Affected kidney & liver function
		77		8,540						
		313	mouse	8,050						Increase in urea & indican in blood serum;decrease in indican in urine; shortened prothrombin time; inhibited excretory hepatic function
			guinea pig	11,150						
			rabbit	5,017						
								rat	5 mg/kg daily	Functional changes in higher nervous activity
							465		0.5 mg/kg daily for 4 1/2 mos	No effect
ETHYL HEXANEDIOL (RUTGERS 612)	pesticide ; repellent	340	rat	2600						
HEPTYL ALCOHOL $CH_3(CH_2)_5CH_2OH$							256	warm-blooded animals	0.0025 mg/kg	Threshold causing slight changes in conditioned reflexes and carbohydrate metabolism

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ALCOHOLS					
HEXYL ALCOHOL $CH_3(CH_2)_5OH$		252	rat	4.1						
ISOBUTYL ALCOHOL $(CH_3)_2CHCH_2OH$	industrial	286	human	intoxication can occur in cases ingesting impure vodka			286	dog & cat	1.85% conc.	Reduced activity of pancreatic juice
METHYL ALCOHOL CH_3OH	used in chemical synthesis, as a fuel, as a solvent & in commercial manufacture of many products	252	f		8100 mg/l had no harmful effects in 24 hr		252	human	small amounts lead to blindness; 10 ml has caused death	
MONOCHLOROHYDRIN $ClCH_2CH_2OH$		210	mouse	135						
NONYL ALCOHOL $CH_3(CH_2)_8OH$							256	warm blooded animals	0.005 mg/kg	Threshold - caused slight changes in conditioned reflexes and carbohydrate metabolism
OLEYL ALCOHOL EO $CH_3(CH_2)_7CH{=}CH(CH_2)_7CH_2O(CH_2CH_2O)_nH$	surfactant	77, 397	rat	2700-25800						
PINE OIL (CYCLIC TERPENE ALCOHOLS)	flotoreagents effluent from non-ferrous ore concentrating plants	233		slight toxic properties when introduced orally						
PROPYL ALCOHOL $CH_3CH_2CH_2OH$	industrial solvent	252	rat	3300						

TABLE IIi (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

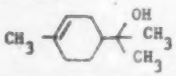
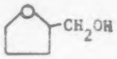
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ALCOHOLS					
STREPTOMYCIN $C_{21}H_{39}N_7O_{12}$	effluent from manufacture of streptomycin	262	mouse	75						
TERPINEOL 	flotoreagent effluent from non-ferrous ore concentrating plants	233	slight toxic properties when introduced orally							
TETRAHYDROFURFURYL ALCOHOL 	industrial effluent	322	albino rat	2500			321	rat, mouse, rabbit	10 mg/kg daily for 4 mos	Affects conditioned reflexes
			white mouse	2300				rat, mouse, rabbit	20 mg/kg daily for 4 mos	Affects cholinesterase activities, prothrombin times, liver glycogen concentrations, and rates of immunization
			guinea pig	3000			320	laboratory animals	>5 ml/1 in drinking water	Pathological changes
							322	rabbit, mouse, rat	20 mg/kg daily	Weight lag; 56% decrease in cholinesterase activity after 2 mos.; 40-70% increase in prothrombin time after 2 mos.
								rabbit, mouse, rat	20 mg/kg daily	Increase in liver glycogen level; leukocytosis; rise in oxygen consumption, hepatic lesions
								rat	10 mg/kg daily (long term)	Decrease in conditioned reflexes

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

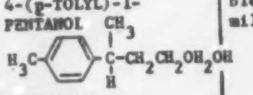
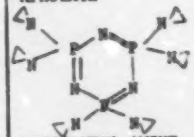
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ALCOHOLS					
4-(p-TOLYL)-1-PENTANOL 	bleached kraft pulp mill waste	450	fish		22 (toxic level)		450	fish		Effective inhibitor for cytochrome oxidase *in vitro*
					AMINES					
ALIPHATIC										
APHOLATE 	pesticide	124	rat	98♂ 113♀ 400-800 (dermal)						
DIAZOBUTYL AMINE $H_2N-CH_2CH_2CH_2CH=N=N$							462	rabbit	1-10 mg/kg for 223 days	Altered cholinesterase activity, oxalacetic, and pyruvic transaminase; decrease in blood prothrombin activity; disturbance of proteinogenic function
DIBUTYLAMINE $CH_3(CH_2)_3\overset{H}{N}(CH_2)_3CH_3$		252, 294	rat	550						
DIETHANOLAMINE $(OHCH_2CH_2)_2NH$		77	rat	1410-1820						
		435, 449	mosquito fish		1400					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

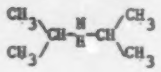
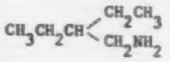
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
DIISOPROPYLAMINE 	effluent from production of chemical poisons	252	rat	770			122, 361	warm blooded animals	0.025 mg/kg	Limiting permissible concentration
		122		550						
		122	mouse	690			122	rat & guinea pig	0.5 mg/kg daily for 6 mos	Decrease in immunobiological organism reaction; increase in lymphocyte number
2-ETHYLBUTYLAMINE  $CH_3CH_2CH<(CH_2CH_3)(CH_2NH_2)$		77, 252	rat	390						
ETHYLENEDIAMINE $NH_2CH_2CH_2NH_2$		77, 252	rat	1160						
HEXAMETHYLENE-DIAMINE $H_2N(CH_2)_6NH_2$	production of nylon						43	rat	100 mg/kg daily	Fur ruffled & lusterless; lack of desire for food; irritation of gastro-intestinal tract; death of most animals after 6-7 doses
								rabbit	0.05 & 0.005 mg/kg daily - 6 mos	Well defined shifts in blood leukocytes, nucleic acid content, cholinesterase activity, glutamic-alanine transferase activity, & in blood serum proteins
HEXAMETHYLENE DIAMINE ADIPATE $NH_2(CH_2)_6NH_2$ + $HOOC(CH_2)_4COOH$	raw product in production of nylon	41	white mouse	700			41	rabbit	5.0 mg/kg daily for 7 mos	Decrease in cholinesterase activity; disturbed blood sugar curve following heavy administration of galactose; increase in number and total protein SH group

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
HEXYLAMINE		252	rat	670						
$CH_3(CH_2)_5NH_2$										
ISOPROPYLAMINE	production of Atrazine (a pesticide)	116	white rat	880			116	laboratory animal		No appreciable cumulative effects; affects CNS
$\begin{matrix}CH_3\\CH_3\end{matrix}>CHNH_2$		77		820						
			white mouse	600			361	warm blooded animals	0.05 mg/1	Limiting permissible concentration
β-MERCAPTODIETHYLAMINE	pesticide; found in waste water from plants manufacturing the pesticide	114	rat	650			114	rabbit	5 mg/kg daily for 5-1/2 mos	Decrease in cholinesterase activity; pathological changes in gastro-intestinal tract; slight change in blood sugar curve
			mouse	550						
$(HSCH_2CH_2)_2NH$			rabbit	350						
MONOETHANOLAMINE	production of dyes, solvents, pharmaceuticals, detergents & some perfume; used in precision instrument construction, aviation, shipbuilding & others as an inhibitor of metal corrosion	341	mouse	15,000			341	rat	0.5 mg/kg daily for 7 mos	Weight change; sick & lethargic; cyanosis; decrease in cholinesterase activity; increase in weight of liver; decrease in blood prothrombin
$NH_2CH_2CH_2OH$		77	rat	20,000						
				2,140						
									0.025-0.25 mg/kg daily for 7 mos	Decrease in blood prothrombin
								rabbit	0.5 mg/kg daily for 7 mos	Decrease in cholinesterase activity; decrease in carbohydrate metabolism in 1 rabbit

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

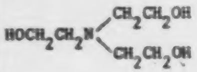
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					AMINES					
PHENYLHYDRAZINE $C_6H_5NHNH_2$	manufacture of dyes; & as a reagent for sugars, aldehydes & ketones; chemical treatment of water in hot water supply systems; used in preparation of synthetic fibers, films & plastics, as softeners & plasticizers in manufacture of rubber, as inhibitors of plant growth, as detergents & softeners in the textile industry	92	rat	188						
			white mouse	175						
			guinea pig	80						
			rabbit	80						
TRIETHANOLAMINE  $HOCH_2CH_2N{<}^{CH_2CH_2OH}_{CH_2CH_2OH}$		77	rat	5680						
TRIETHYLAMINE $(C_2H_5)_3N$	process of organic synthesis in the production of herbicides & accelerators for synthetic rubber	176	white mouse	545.8			176	rabbit	6 mg/kg daily for 7 mos	Disturbance in carbohydrate function of liver
		77	rat	460				albino rat	54.5 mg/kg daily for 2 mos	No cumulative effects
							177	rat	10.0 & 1.0 mg/kg daily	Significant changes in electroencephalogram & conditioned reflexes

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

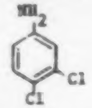
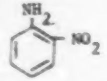
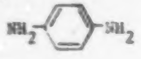
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
AROMATIC										
3,4-DICHLORANILINE 							57	rat	20 mg/kg daily	Change in neutrophil phagocytosis
o-NITROANILINE 		269	mouse guinea pig	1246.1 2350			269	rat		Spasms; increased quantity of hemoglobin, erythrocytes, & reticulocytes, the phenomenon of Heinz bodies, leukocytosis, neutrophilis, lymphopenia (acute intoxication)
m-NITROANILINE		269	rat guinea pig	700 450			269	rat		Same as o-Nitroaniline except had inhibitions & no spasms
p-NITROANILINE		269	rat guinea pig	1500 450			269	rat		Same as o-Nitroaniline
p-PHENYLENEDIAMINE (URSOL) 	effluent from aniline dye & fur dyeing plants						461	rabbit	0.05 mg/kg daily for 6-7 mos	Change in blood sugar; induced allergic sensitivity
							460	rabbit	0.5 mg/kg daily for 7 mos	Change in general condition & behavior; increase in number of reticulocytes; disturbed liver glycogenic function; disturbed carbohydrate liver function; induced allergy sensitivity
									0.5-5.0 mg/kg daily for 7 mos	Change in conditioned reflexes

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

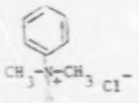
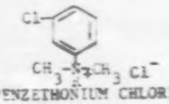
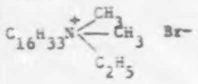
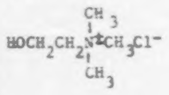
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
AMINES										
QUARTERNARY										
ALKYLDIMETHYLBENZYL-AMMONIUM CHLORIDE 	synthetic surfactant; used in textile, mining, metal-working, food, paper & other industries, in agriculture, & as detergents	138	albino rat	340			138	human		Skin irritation; CNS poison
ALKYLDIMETHYLCHLORO-BENZYLAMMONIUM CHLORIDE 	synthetic surfactant; used in textile, mining, metal-working, food, paper & other industries, in agriculture, & as detergents	138	albino rat	2000			138	human		Skin irritation; CNS poison
BENZETHONIUM CHLORIDE (HYAMINE 1622)	pesticide	174	coho salmon		53 (48 hr)					
CETYLDIMETHYLETHYL-AMMONIUM CHLORIDE  $C_{16}H_{33}\overset{+}{N}(CH_3)_2(C_2H_5)\ Br^-$	synthetic surfactant; used in textile, mining, metal-working, food, paper & other industries, in agriculture & as detergents	138	albino rat	60			138	human		Skin irritation, CNS poison
CHOLINE CHLORIDE  $HOCH_2CH_2\overset{+}{N}(CH_3)_2CH_3Cl^-$		468	human	5-20 g/1 - minimum to affect human organism						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

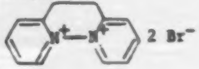
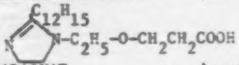
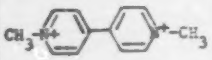
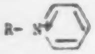
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
DIQUAT 	pesticide	173	rat	400-440						
		174	chinook salmon		38.5 (24 hr)					
LAURYL IMIDAZOLINE 	surfactant	397, 77	rat	3200						
PARAQUAT 	pesticide	124	rat	100♂ 110♀ 80♂) (dermal) 90♀)						
		173		112-200						
QUARTERNARY AMMONIUM CHLORIDE (PREPARATION 34) $(R)_4N^+Cl^-$	surfactant	467	rat	750			467	albino rat & rabbit	0.05, 0.5 & 10 mg/kg daily for 6 mos	0.05 had no effect on animals; alterations in transaminase activity; inhibition of cholinesterase activity at 0.5 mg/kg only; inhibition of blood catalase; decrease in ascorbic acid content in hepatic tissue; histological variations in organs
			mouse	744						
QUARTERNARY PYRIDINIUM 	component in detergent or cleaning formulation	397	rat	200-250						
			mouse	470-2500						
			guinea pig	200						
			rabbit	400						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

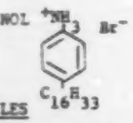
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
STERINOL 	detergent	20	rat	250						
NITRILES										
ACETONE CYANOHYDRIN $(CH_3)_2C(OH)CN$		365	rat	13.3			365	rat	0.0005 mg/kg daily for 6 mos	Affect on blood morphology, catalase and cholinesterase activity, vitamin C concentrations and conditioned reflexes
			mouse	2.9						
			guinea pig	9.0						
			rabbit	13.5						
ACETONITRILE $CH_3C=N$	petrochemical	77	rat		3800					
		252	bluegill		1850					
			fathead		1000					
			guppy		1650					
ACRYLONITRILE CH_2CHCN	pesticide; used in manufacture of plastics & synthetic rubber	340	rat	81-106			454	rat	1 mg/kg daily for 6 mos	Depressed response to weak stimulation and the appearance of narcotic, equalizing and paradoxical phases
		252	pin perch		24.5 (24 hr)					
			bluegill		11.8					
			fathead		14.3-18.1			rabbit	10 mg/kg daily for 6 mos	Slight microcellular proliferation in the interstitial kidney tissue & some homogenation of blood vessels in internal organs
			guppy		33.5					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

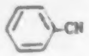
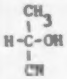
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
ADIPONITRILE $NC(CH_2)_4CN$	production of nylon; petrochemical	196	rat	105			196			Change in internal organs & behavior
			white mouse	48						
			rabbit	19.4						
		449	bluegill		720					
			fathead		820					
			guppy		775					
BENZONITRILE 	petrochemical	449	bluegill		78					
			fathead		78					
			guppy		400					
LACTONITRILE CH_3-C(H)(OH)-CN	petrochemical	449	bluegill		0.90					
			fathead		0.90					
			guppy		1.37					
			pin perch		0.215 (24 hr)					
LETHANE 384 $CH_3(CH_2)_3$-O-$(CH_2)_2$-O-$(CH_2)_2$-SCN	pesticide	340	rat	90						
		49		1190 (50% active agent)						
		173		90-300						
OXYDIPROPIONITRILE $NCCH_2CH_2$-O- CH_2CH_2CN	petrochemical	77	rat		2830					
		449	bluegill		4200					
			fathead		3600					
			guppy		4450					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

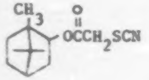
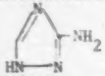
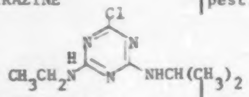
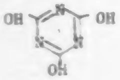
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
THANITE 		340	rat	1600						
		49		2140 (82% active agent)						
HETEROCYCLIC										
ACRIDINE $C_6H_4CHNC_6H_4$	tar & gas wastes	49	perch		0.7 (fatal in 1 hr)					
AMITROLE (ATA, WEEDA ZOL, AMINOTRIAZOLE) 	pesticide	252	rat	14,700 25,000						
		173		1100-2500						
		252	red-sided shiners		983.3-1370					
ATRAZINE 	pesticide	173	rat	2000	1.25 (50% in A361; 48 hr)					
		251	minnow							
CYANURIC ACID 							249	rat & guinea pig	30 mg/kg daily for 6 mos	Reduced amount of ascorbic acid in kidneys and spleen of guinea pig; dystrophic changes in kidneys
								rat & guinea pig	200 mg/kg daily for 6 mos	Suppression of weight increase; reduced amount of ascorbic acid in spleen & kidneys of guinea pig; dystrophic changes in kidneys

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

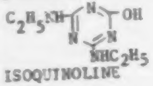
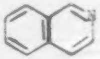
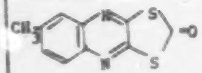
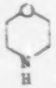
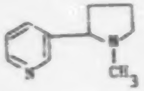
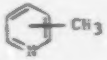
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
2-HYDROXYSIMAZINE 	pestici						24	rat & guinea pig	250 mg/kg daily for 6 mos	Atrophic gastritis
ISOQUINOLINE 		174	sunfish		65 (fatal in 1 hr)					
			perch		100 (fatal in 1 hr)					
MORESTAN 	pesticide	124	rat	1800♂ 1100♀ >2000 (dermal)						
MORPHOLINE 	industrial	124	rat	1050						
NICOTINE 	pesticide	304	mammal	2-10						
		124	rat	83 (as sulfate) 285 (as sulfate) (dermal)						
		340	rat	19 (as sulfate)						
		252		55.2						
PICOLINE 	some industrial wastes	252	rat	1.29						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

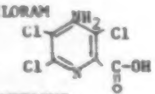
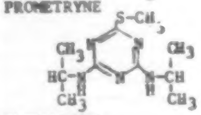
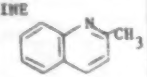
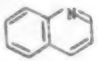
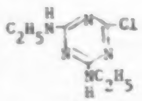
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Specie	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AMINES					
PICLORAM 	pesticide						182	bird		No chronic toxicity
PROMETRYNE 	pesticide	19	rat	2138			19		0.625 mg/kg daily for 6 mos	Affects conditioned reflexes, blood composition, carbohydrates, metabolism, and histology
			mouse	3126						
QUINALDINE $C_{10}H_9N$ 	coal tar & gas plant wastes	252	trout		5.0 (lethal in 1 hr)					
			rat	1230						
QUINOLINE C_9H_7N 	tar & gas wastes	174	sunfish		52-56 (lethal in 1 hr)		252			Paralyzes respiratory muscles
			perch		30-50 (lethal in 1 hr)					
		252			<30 - lethal					
			trout		5.0 (lethal in 14 hr)					
			bluegill		5.0 (lethal in 4 hr)					
			fish		7.5 - lethal					
SIMAZINE 	pesticide	173	rat	5000			249	rat & guinea pig	100 mg/kg daily for 6 mos	Suppressed weight increase; increase in number of leucocytes; decrease in cholinesterase activity in blood; atrophic gastritis
		174	rainbow trout		85 (48 hr Tlm)					
		174, 252	chinook salmon		6.6 (48 hr)					
		251	minnow		0.5 (lethal in 3 days)					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					AMINES					
STRYCHNINE $C_{21}H_{22}N_2O_2$	pesticide	304	rat	4.0♂) 1.8♀)	(subcutaneous)					
					ORGANIC ACIDS					
CARBOXYLIC										
ACRYLIC ACID CH_2=CHCOOH		195	rat white mouse rabbit	1250 830 250			195	mouse	≧ 0.25 mg/kg daily for 2 mos	Physiological effects
ADIPIC ACID HOOC$(CH_2)_4$COOH		88	bluegill		<330 (24 hr)					
BENZOIC ACID C_6H_5COOH	tar & gas wastes	174 435, 252	sunfish mosquito fish		550-570 (lethal in 1 hr) 180					
BUTYRIC ACID $CH_3CH_2CH_2$COOH		88	D. magna		61 (48 hr)					
CAPROIC ACID $CH_3(CH_2)_4$COOH		88	bluegill		>150-<200 (24 hr)					
CHLORENANTHIC ACID $Cl(CH_2)_6$COOH	effluent from production of enantha fiber	215	white mouse	1800			215	rat	200 mg/kg daily for 2-1/2 mos	Slight decrease in cholinesterase activity

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ORGANIC ACIDS					
CHLORENANTHIC ACID (Cont.)							215	rat & rabbit	5 mg/kg daily for 6-1/2 mos ; 50 mg/kg daily for 6-1/2 mos	No significant change in leukocyte number, blood sugar, blood cholinesterase or conditioned reflexes
								rat	300 mg/kg daily for 1-1/2 mos	Increase in leukocyte number
CHLOROPELARGONIC ACID $Cl(CH_2)_8COOH$	effluent from production of enantha fiber	215	white mouse	3000				rat	300 mg/kg daily for 1-1/2 mos	Increase in leukocyte number
CHLORUNDECANOIC ACID $Cl(CH_2)_{10}COOH$	effluent from production of enantha fiber	215	white mouse	6000						
CITRIC ACID $C_6H_8O_7$	industrial waste	449	D. magna		185 (fatal in 10-17 hr)					
DALAPON (DOWPON) CH_3CCl_2COONa	pesticide	198 252 173	albino rat	4700 6590-8120 4000-9300			199	albino rat	235 & 940 mg/kg daily for 2 mos	At 940 mg/kg animals showed a decrease in weight gain; decrease in serum SH groups; increase in vitamin C content of suprarenals; increase in weight coefficient of liver, kidneys, spleen, thyroid, pituitary & suprarenals; histological changes with both doses
		198	white mouse	7100						
		174	coho salmon		340 (48 hr)					
		438	bass		>1000 (48 hr)					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

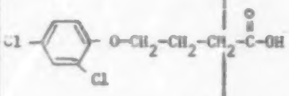
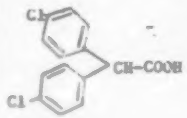
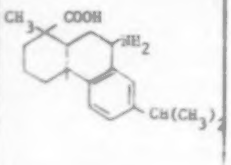
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ORGANIC ACIDS					
DALAPON (Cont.)							199		200 mg/kg P.O. 5 mos 6 x week	Lowered SH groups in serum; increase in weight of thyroid; slight dystrophyin parenchymatous organs
									10 mg/kg P.O. 5 mos 6 x week	Lowered concentration in SH groups in serum; change in conditioned reflexes
2,4-DB	pesticide	438	rat	2500 (LD 100)			129	rat	500 mg/kg daily for 10 days	Weight loss; decrease in blood catalase activity; histological damage in liver; intoxication
			mouse	75 (LD 100)						
		174	bluegill		8 (48 hr)					
			largemouth bass		10 (48 hr)			rat	1 mg/kg daily for 6 mos	No appreciable effects
DDA	pesticide (metabolite of DDT)	124	rat	740♂ 600♀						
										
DELRAD	pesticide	252	rat	850						
			fathead		0.16-0.23					
			catfish		0.67					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

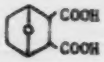
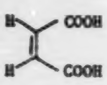
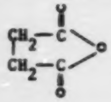
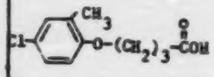
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ORGANIC ACIDS					
ENDOTHALL	pesticide	252 173	rat	35 80						
		174 252	largemouth bass		200 (48 hr) >135					
GLUTARIC ACID $CH_2(CH_2COOH)_2$		88	bluegill		330 (24 hr)					
LACTIC ACID $C_3H_6O_3$	industrial waste	449	D. magna		191 (fatal in 6-48 hr)					
MALEIC ACID	effluent from production of maleic anhydride		rat				229	rat	0.06 mg/kg daily for 6 mos	Affects glycogen synthesizing liver function
								rabbit	6 mg/kg daily for 5 mos	Decrease in phagocytic activity
MALEIC ANHYDRIDE 		435	mosquito fish		230		232	rabbit	2.5 mg/kg daily for 6 mos	Disturbance in liver glycogenic synthesizing function; some histological changes
									5 mg/kg daily for 5 mos	Change in phagocytic activity
MALONIC ACID HOOC CH_2COOH		88	bluegill		150 (24 hr)					
MCPB	pesticide	173	rat	680						
		174	bluegill		15 (48 hr)					
			largemouth bass		10 (48 hr)					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

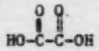
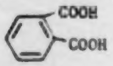
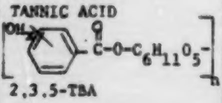
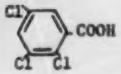
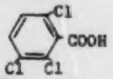
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ORGANIC ACIDS					
OXALIC ACID  $HO-C(=O)-C(=O)-OH$		88	bluegill		4000 (24 hr)					
		435	mosquito fish		1350					
PHTHALIC ACID 		258	rat	1100			258	labora-tory animals	0.56 mg/kg daily for 6 mos	Reduces thrombocyte conc., increases bilirubin excretion, morphological changes in internal organs
TANNIC ACID 		435	mosquito fish		37					
2,3,5-TBA 	pesticide	174	bluegill		90 (48 hr)					
			largemouth bass		55 (48 hr)					
		252	laboratory animals	300-1500						
2,3,6-TBA 	pesticide	174	bluegill		1750 (48 hr)					
			largemouth bass		1250 (48 hr)					
		173	rat	1500						
TCA CCl_3COOH		252	rat	3300-3370			252	rat	0.3%/day for 4 mos	Inhibited growth rate
		174	channel cat		>2000 (48 hr)					
		252			>2000					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

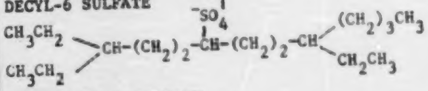
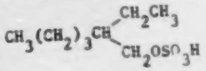
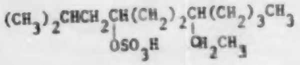
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ORGANIC ACIDS					
SULFATES ALKYL SULFATE R-O-SO_3^-		251	fathead		5.1-5.9					
3,9-DIETHYL-TRI-DECYL-6 SULFATE	surfactant	397	rat	1430			397	rat	65 mg/kg daily for 30 days	No effects
			guinea pig	425						
2-ETHYLHEXYL SULFATE		397	rat	4125			397	rat	175 mg/kg 30 days	No effects
			guinea pig	1520				rabbit	100 mg/kg	Noticeable effect
7-ETHYL-2-METHYL-UNDECYL-4 SULFATE	surfactant	397	rat	1250			397	rat	25 mg/kg 30 days	None
 $(CH_3)_2CHCH_2CH(OSO_3H)(CH_2)_2CH(CH_2CH_3)(CH_2)_3CH_3$			guinea pig	650						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

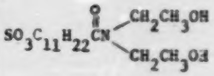
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ORGANIC ACIDS						
LAURIC DIETHANOLAMIDE SULFONATE	surfactant	397	rat	2700						
 $SO_3C_{11}H_{22}\overset{\overset{O}{\|}}{C}N{<}^{CH_2CH_3OH}_{CH_2CH_3OH}$										
LAURYL ALCOHOL SULFATE EO	surfactant	397	rat	4150-9350						
			mouse	1170-7600						
$SO_4C_{12}H_{24}C$										
LAURYL GLYCERYL SULFATE	surfactant	397	rat	1820			397	rat	5000 ppm in diet 2 yrs	None
$SO_4C_{11}H_{22}CH_2OCH_2CHOHCH_2OH$										
LAURYL SULFATE $C_{12}H_{25}OSO_3H$	surfactant	397	rat	1000-2730			397	rat	30 mg/kg 160 days 10,000 ppm in food 2 yrs 60 mg/kg 5 wks	None None None

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

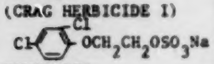
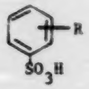
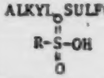
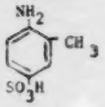
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ORGANIC ACIDS						
LAURYL SULFATE (Cont.)							397	mouse	10,000 ppm in food 3 mos	None
								dog	135 mg/kg/ day	None
								guinea pig	2000 ppm H_2O 180 days	None
SESONE (CRAG HERBICIDE I) 	pesticide	252	rat	640-1330 700-1400			252	dog	360 mg/kg/ day in diet for 1 yr.	None
SULFONICS										
ALKYLARYL SULFONATE 	surfactant						397	rat	700 mg/kg/ day for 2 mos	Some deaths
								guinea pig	2000 mg/1 in water - 180 days	None
							252	human	100 mg/day 4 mos.	No effect
ALKYL SULFONATE  $R-\overset{O}{\underset{O}{S}}-OH$	surfactant	81	rat	2700 3000			397	rat	0.1 LD 50/day for 45 days	None
4-AMINO-m-TOLUENE-SULFONIC ACID 	industrial waste	435	mosquito fish		375					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

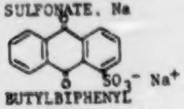
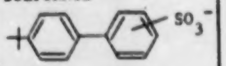
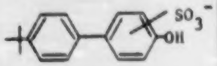
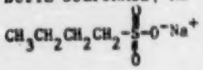
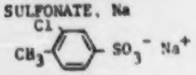
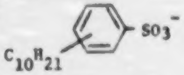
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ORGANIC ACIDS					
ANTHRAQUINONE-α SULFONATE, Na 		88	D. magna		50					
BUTYLBIPHENYL SULFONATE 	surfactant	397	mouse	3400						
BUTYLPHENYLPHENOL SULFONATE 	surfactant	397	mouse	2200-3800			397	guinea pig	2000 mg/1 in water for 180 days	None
BUTYL SULFONATE, Na  $CH_3CH_2CH_2CH_2-\overset{O}{\underset{O}{S}}-O^-Na^+$		88	D. magna	2700						
p-CHLOROBENZENE SULFONATE, Na $p-ClC_6H_4SO_3Na$		88	D. magna		2150		292	rat & rabbit	250 mg/kg daily	No effect
2-CHLOROTOLUENE-4-SULFONATE, Na 		88	bluegill		<1374 (24 hr)					
DECYLBENZENE SULFONATE 	surfactant	397	mouse	2000						
		77	albino rat	2320						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

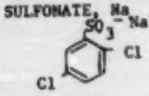
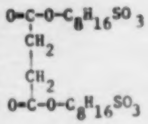
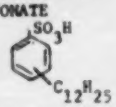
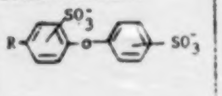
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ORGANIC ACIDS					
2,5-DICHLOROBENZENE SULFONATE, Na 		88	D. magna		938					
DIOCTYL SUCCINATE SULFONATE	surfactant	397	rat	1900			397	rat	200-900 mg/kg/day 6 mos	None
			mouse	4800				mouse	4 mg/day 7 mos	None
								rabbit	500 mg/kg/day 24 wk.	Some deaths
								rabbit	250 mg/kg/day 5 mos	None
								dog	250 mg/kg/day 24 wk.	None
								monkey	125 mg/kg/day 24 wk.	None
								guinea pig	2000 mg/1 in H_2O 180 days	None
DODECYLBENZENE SULFONATE 	surfactant	81	rat	2300			241	trout	5 mg/1	Spermotocytes lost their mobility; fertilized eggs killed
								carp fry	sublethal amounts	Growth rates affected
DODECYL DIPHENYL ETHER SULFONATE 	surfactant	77, 397	rat	700						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

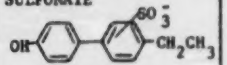
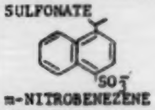
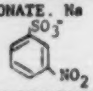
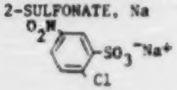
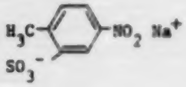
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ORGANIC ACIDS					
ETHYLPHENYLPHENOL SULFONATE 	surfactant	77, 397	rat	2000						
ISOPROPYL NAPHTHALENE SULFONATE 	surfactant	397	rat	1900						
m-NITROBENEZENE SULFONATE, Na 	"	88	D. magna		3067					
4-NITROCHLOROBENZENE 2-SULFONATE, Na 	"	88	bluegill		948-1474					
4-NITROTOLUENE-2-SULFONATE, Na 	"	88	bluegill		<1440 (24 hr)					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

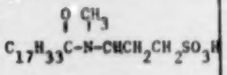
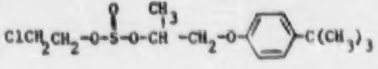
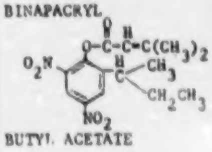
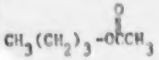
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ORGANIC ACIDS						
OLEOYLMETHYL TAURIDE	surfactant	397	rat	4000			397	rat	20,000 ppm in food 4 mos	None
 $C_{17}H_{33}\overset{O}{C}-\overset{CH_3}{N}-CHCH_2CH_2SO_3H$			mouse	6300-6600				guinea pig	2000 ppm in water	None
					ESTERS					
AMYL ACETATE $CH_3CO_2C_5H_{11}$		435	mosquito fish		65					
ARAMITE	pesticide	252	rat	6300 3900			252	rat & dog	500 mg/kg in diet of rat 2 yr	None
			mouse	2300						
		449	bluegill			480				
			rainbow trout			730				
BINAPACRYL	pesticide	124	rat	63♂ 58♀						
			rat	810♂) 720♀) (dermal)						
		173		58-225						
BUTYL ACETATE	industrial manufacture of plastics, lacquer, artificial leather, photographic films	252 46	rat	4130 13-100						
 $CH_3(CH_2)_3-O\overset{O}{C}CH_3$			rabbit	3200						
			mouse	7700						
		252		7060						
		46	guinea pig	4700						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

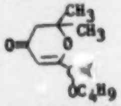
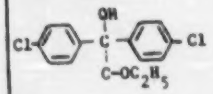
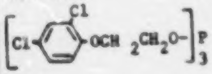
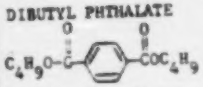
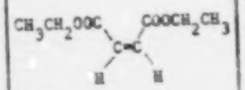
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ESTERS					
BUTYL MESITYL OXIDE (INDALONE) 	pesticide	340	rat	7400						
CHLOROBENZILATE 	pesticide	124	rat	1040♂ 1220♀ >5000 (dermal)						
2,4 DEP 	pesticide	451 173	rat	7.5 850			451	rat & monkey		Inhibition of brain cholinesterase activity
DIBUTYL PHTHALATE 		340	rat	1200-20,000						
DIETHYL MALEATE 	effluent from plants manufacturing karbophos	346	rat mouse guinea pig	1350 2590 1450			346	rabbit	100 mg/kg day, 6 mos	Increase in gamma-globulin; decrease in albumin; neutrophilic leukocytosis; increase in vitamin C in blood; bronchial pneumonia; slight fatty liver infiltration
									application to skin and mucous membrane	Irritation

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

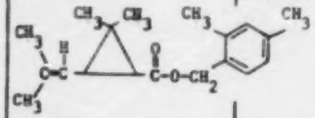
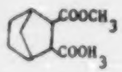
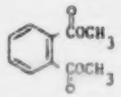
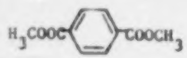
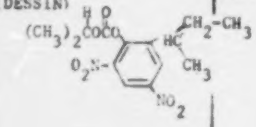
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ESTERS					
DIMETHRIN 	pesticide	124, 173	rat	>15,000						
DIMETHYL CARBATE 	pesticide	340	rat	1150						
DIMETHYL PHTHALATE 		340	rat	8200						
DIMETHYLTEREPHTHALATE 		325	white rat	2000 (did not lead to death) mg/kg						
DINOBUTON (DESSIN) 	pesticide	124	rat	59♂ 71♀ 1500-2000♂ (dermal) >2000 (dermal)						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

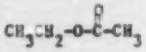
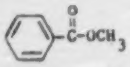
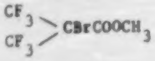
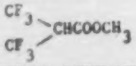
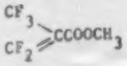
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ESTERS					
DRIONE SiO_2 + pyrethrins + piperonyl butoxide	pesticide	340	mammal	0						
ETHYL ACETATE  $CH_3CH_2-O-\overset{O}{\overset{\|}{C}}-CH_3$		221 294 221	rat white mouse	>5000 5620 >5000			221	laboratory animals	1000 mg/kg in food for one month	None
METHYL BENZOATE 		27	rat mouse	3540 3000			27	laboratory animals	500 mg/kg 1-1/2 mos	Various physiological changes
METHYL HEXAFLUORO-2-BROMOBUTYRATE  $(CF_3)_2 > CBrCOOCH_3$	refrigerants, propellants, fire extinguishers, solvents	106	rat	980						
METHYL HEXAFLUORO-ISOBUTYRATE  $(CF_3)_2 > CHCOOCH_3$	refrigerants, propellants, fire extinguishers, solvents	106	rat	300						
METHYL PERFLUORO-METHACRYLATE  $CF_3(CF_2{=})CCOOCH_3$	refrigerants, propellants, fire extinguishers, solvents	106	rat	220						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

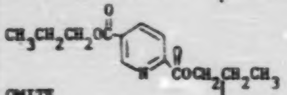
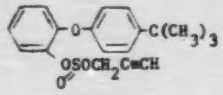
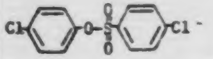
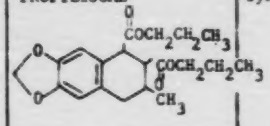
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ESTERS					
METHYL TETRAFLUORO-PROPIONATE CF_3-CHF-CO-O-CH_3	refrigerants, propellants, fire extinguishers, solvents	106	rat	~10,000						
MGK REPELLENT 326 	pesticide	340	rat	5230-7230						
OMITE 		124	rat	1480 250♂) (dermal) 680♀)						
OVEX (OVOTRAN) 	pesticide	252	rat	2000			252	rat	1000 mg/kg in diet	Minimal liver damage
		449	bluegill			870			10,000 mg/kg in diet	Adverse growth and pronounced liver and kidney damage
			rainbow trout			860				
PROPYLISOME 	synergist	340	rat	5000-15,000						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

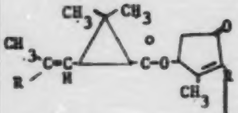
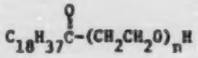
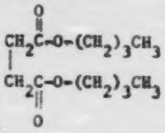
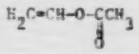
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ESTERS					
PYRETHRINS	pesticide	340	rat	200-2600						
		252		200						
		449	bluegill			78				
			rainbow trout			56				
		252	man	fatal dose for 70 kg man is 50 g						
SESAME OIL mixture of tri-glycerides	synergist	340	rat	>2000-2270						
STEAROYL EO	surfactant	397	rat	53,000-64,000						
			hamster	20,000-27,000						
 $C_{18}H_{37}\overset{O}{C}-(CH_2CH_2O)_nH$			rabbit	12,000 +						
TABUTREX  $CH_2\overset{O}{C}-O-(CH_2)_3CH_3$ $CH_2\underset{O}{C}-O-(CH_2)_3CH_3$	pesticide	340	rat	8000						
VINYL ACETATE		133	rat	2120						
 $H_2C=CH-O-\underset{O}{C}CH_3$		77		2920						
		133	mouse	1613						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

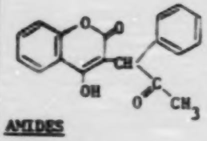
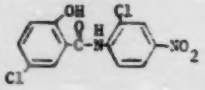
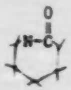
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ESTERS					
WARFARIN 	pesticide	124	rat	3.0						
					AMINE DERIVATIVES					
AMIDES										
ACETAMIDE CH_3CONH_2	refinery waste	435	mosquito fish		13,000					
BAYLUSCIDE (BAYER 73) 	pesticide	248	rainbow trout		0.1 (death in 15 min)					
			flathead catfish		0.1 (death in 1 hr)					
			yellow perch		0.1 (death in 24 hr)					
			white sucker		1.0 (death in 15 min)					
			green sunfish		1.0 (death in 15 min)					
			yellow perch		1.0 (death in 15 min)					
			black bullhead		10.0 (death in 15 min)					
			bluegill		10.0 (death in 15 min)					
CAPROLACTAM 	effluent from plants producing caprone						350	rabbit	50-500 mg/kg in diet for 6 mos	Change in behavior; change in growth rate; change in mucous membrane of stomach and intestines
								mouse	15 mg/kg daily for 2 mos	Change in conditioned reflexes

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

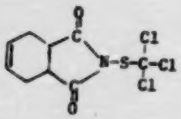
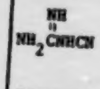
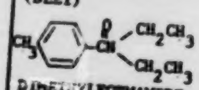
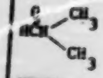
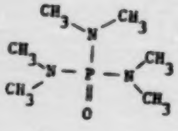
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
CAPTAN (ORTHOCIDE) 	pesticide	252	rat	15,000						
		173		9000 8400						
		252	rabbit	3160						
DICYANODIAMIDE  $NH_2\overset{\overset{NH}{\|}}{C}NHCN$		121	laboratory animals	50 mg/kg (not toxic)						
DIETHYLTOLUAMIDE (DEET) 	pesticide	340	rat	1950						
DIMETHYLFORMAMIDE 	effluent from acrynil manufacturing plants						457	rabbit	>250 mg/kg	Reduced respiration rate
							456	rat	1 g/kg	Affected central nervous system
HEMPA 	pesticide	124	rat	2650♂ 3360♀ 3500-4500 (dermal)						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

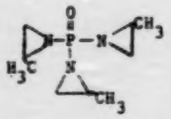
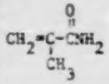
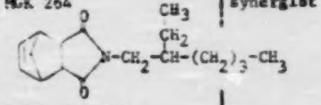
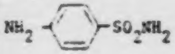
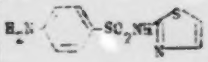
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
METEPA 	pesticide	124	rat	136♂ 213♀ 183 (dermal)						
METHACRYLAMIDE  $CH_2=\overset{\overset{O}{\parallel}}{C}-CNH_2$ with CH_3 below C		392	rat mouse rabbit	1223 475 1865			392	laboratory animals	0.05-1.0 mg/kg daily	Decreased cholinesterase activity in blood; increased concentration of ascorbic acid in kidneys; decreased conditioned reflexes
METHYLOLMETHACRYLAMIDE		392	rat mouse rabbit	312 400 328			393	laboratory animals	0.05-1.0 mg/kg daily	Same as above
MGK 264 	synergist	340	rat	2800						
SULFANILAMIDE 		99	mouse	6000			99	rabbit	200 mg/kg daily for 9 mos	Decrease in hemoglobin and total protein; increase in aldolase and aniline transaminase
SULFATHIAZOLE (NORSULFAZOLE) 							94	rabbit	0.5 mg/kg	Critical concentration

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

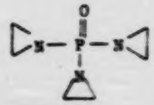
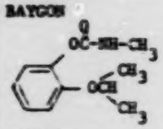
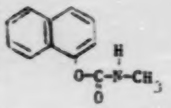
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
TEPA	pesticide	124	rat	37 87 (dermal)						
										
CARBAMATES										
BAYGON	pesticide	124	rat	>2400 (dermal) 83-86						
		340		95-104						
CARBARYL (SEVIN)	pesticide	173	rat	400			123	white rat		No cumulative properties
		123	white rat	505						
		309		500						
		124		850♂ 500♀ >4000 (dermal)						
		340		500-700						
		252		500-2190						
			cat	125-250						
			dog	250-795						
			rabbit	710						
		174	fathead		12.0					
		252			6.7-41.0					
		174	bluegill		5.5					
		252			5.6-11.0					
		449				3400				
			rainbow trout			3500				

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

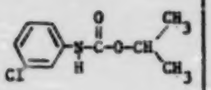
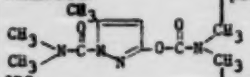
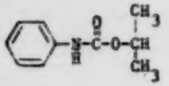
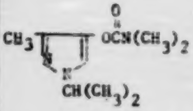
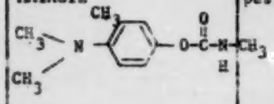
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
CHLORPROPHAM **(CHLORO IPC)**	pesticide	252 173	rat	1500 3800-8000						
		174	bluegill		12 (48 hr)					
			largemouth bass		10 (48 hr)					
		252	catfish		86.5					
DIMETILAN 	pesticide		rat	25-64 25-50						
IPC **(PROPHAM)** 	pesticide	252 173	rat	1000 1000-9000						
ISOLAN	pesticide	124, 252	rat	23♂ 13♀						
				5.6♂) 6.2♀) (dermal)						
		173		12						
MATACIL 	pesticide	124	rat	40♂ 38♀						
				280♂) 320♀) (dermal)						
		173		30						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

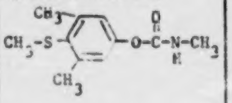
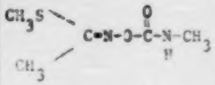
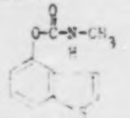
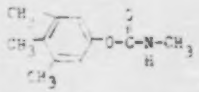
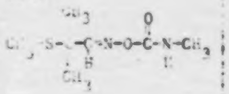
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
MESUROL (METMERCAPTURAN) 	pesticide	124	rat	70♂ 60♀ >2000 (dermal)						
METHOMYL 	pesticide	149	carp	4.2 mg/fish 0.036 mg/fish (tropical) 2.0 mg/fish (contact)						
MOBAM 	pesticide	124	rat	150♂ 115♀ >2000 (dermal)						
		173		>234						
SD-8530 	pesticide	124	rat	232♀ 205♂ >2000 (dermal)						
TEMIK 	pesticide	124	rat	0.8♂ 0.6♀ 3.0♂) (dermal) 2.5♀)						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

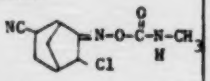
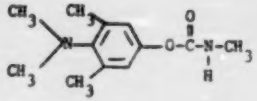
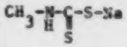
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
TRANID 	pesticide	124	rat	30♂ 19♀ >2000 (dermal)						
ZECTRAN 	pesticide	124	rat	37♂ 25♀ 1500-2500 (dermal)						
THIOCARBAMATES										
CARBATHION  $CH_3-\underset{H}{N}-\underset{\underset{S}{\parallel}}{C}-S-Na$	pesticide	276, 278	white rat white mouse	700 266			276			Affects cholesterol level in serum & liver; anemia; slight cumulative effects

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

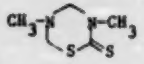
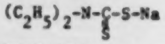
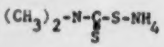
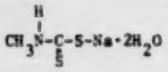
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
DAZOMET (CRAG MYLONE) 	pesticide	173	rat	320-1000						
		49		325						
DIETHYL DITHIO-CARBAMATE, Na  $(C_2H_5)_2-N-\underset{S}{\overset{\|}{C}}-S-Na$		130	chick embryo	0.0058						
DIMETHYLDITHIO-CARBAMATE, NH_4  $(CH_3)_2-N-\underset{S}{\overset{\|}{C}}-S-NH_4$		276, 278	white rat	1458			276			Affects cholesterol level in serum & liver; anemia; slight cumulative effect
			white mouse	592						
			guinea pig	1680						
FERBAM (FERMATE) $((CH_3)_2NCS_2)_3Fe$	pesticide	438	fish		1.0-4.0 (toxic level for fish)					
		252	rat	4000						
				17,000						
			channel catfish		2.2					
		130	chick embryo	0.0022						
METHAM (VAPAM)  $CH_3\overset{H}{\overset{\|}{N}}-\underset{S}{\overset{\|}{C}}-S-Na\cdot 2H_2O$	pesticide	252	rat	800						
		173		82						
		252	mouse	285						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

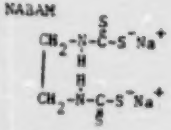
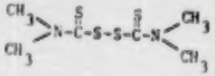
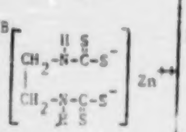
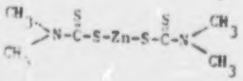
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
NABAM 	pesticide	252 130	rat chick embryo	395 0.140						
THIRAM 	pesticide	124 173 252 252 130	rat rabbit chick embryo	640♂ 620♀ >2000 (dermal) 375-1000 350 865 350 350 0.0019						
TRIARAM bis (D. ethyl thiocarbamoyl) ethylene bis (dithiocarbamate)	pesticide	252 130	channel cat chick embryo	 0.0048	0.079					
ZINEB 	pesticide	124 173	rat	>5000 >2500 (dermal) 1000-8000						
ZIRAM 	pesticide	130	chick embryo	0.0021						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

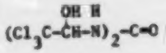
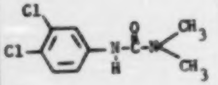
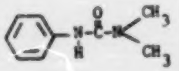
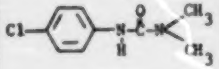
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				AMINE DERIVATIVES						
UREAS										
DCU (CRAG HERBICIDE DCU)	pesticide	49	rat	4760♂						
		173		6800						
 $(Cl_3C\text{-}\overset{OH}{C}H\text{-}\overset{H}{N})_2\text{-}C{=}O$										
DIURON (KARMEX)	pesticide	252	rat	3400						
		173		3400-3700						
		449	bluegill			12.0				
		174	coho salmon		28.5 (48 hr)					
		252			16.0 (48 hr)					
FENURON	pesticide	252	rat	7500						
		173		6400-7500						
		252	salmon		>56					
MONURON (CMU)	pesticide	252	human	lethal dose 326 g/90 kg						
			rat	3500						
		173		3600-3700						
		174	coho salmon		110 (48 hr)					
		252	shiner		40.1					
			red-sided shiner		41.5					
UREA $(NH_2)_2CO$		250	rat	≤ 12,000 (did not cause death)			250	rat	50 mg/kg	Did not alter urea balance or organism

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

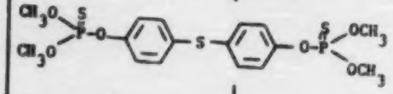
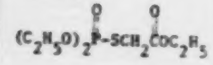
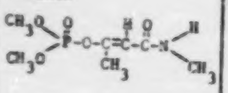
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
ABATE 	pesticide	340 173 124	rat	1000-3000 1000-4000 8600♂ 13,000♀ >4000 (dermal)			299	rat	200 ppm for 99 days in diet	70% inhibition of blood cholinesterase
		299	rat & mouse	4000				rabbit	10 mg/kg daily 100 mg/kg daily	Minor liver damage; liver necrosis
								ewe	5 mg/kg while nursing offspring	Inhibition of cholinesterase activity
								human	256 mg/day for 5 days or 64 mg/day for 4 wks	No toxic symptoms in 28 volunteers
ACETOPHOS  $(C_2H_5O)_2\overset{O}{\overset{\|}{P}}-SCH_2\overset{O}{\overset{\|}{C}}OC_2H_5$		202	rat	45						
			mouse	210						
			guinea pig	27.8						
			rabbit	45						
AZODRIN 	pesticide	124	rat	17♂ 20♀ 126♂) (dermal) 112♀)						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

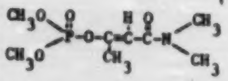
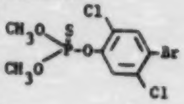
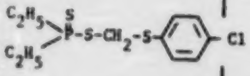
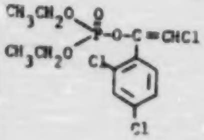
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
BIDRIN 	pesticide	173	rat	22-45						
		309		25						
		124		21♂ 16♀ 43♂) 42♀) (dermal)						
BROMOPHOS 	pesticide	124	rat	1600♂ 1730♀						
		173		>5000 (dermal) 3570-5180						
CARBOPHENOTHION (TRITHION) 	pesticide	124	rat	30♂ 10♀ 54♂) 27♀) (dermal)						
		49		32						
		173		7-30						
CHLORFENVINFOS 		124	rat	15♂ 13♀			299	rat	10-15 mg/kg	Death
		173		31♂) 30♀) (dermal)				dog	5000 mg/kg	Tolerates this dose probably due to its more efficient detoxication, less readily available blood levels of pesticide, slower rate of brain uptake and less sensitive brain central nervous system
		173		10-155						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

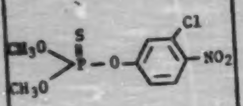
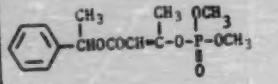
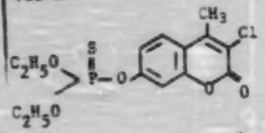
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
CHLORTHION	pesticide	124, 451	rat	880♂ 980♀			252	dog	15 mg in diet	Questionable red cell inhibition
				1500-4500♂) (dermal) 4100♀)			441	goldfish	0.1 mg/1	Effect on cholinesterase activity - may take up to 40 days to regain normal activity
		252 173	rat	550-1510 625-1500						
		252	bobwhite quail	700						
		174	fathead		3.2					
		442	bluegill		0.70					
		252	human			60 g/70 kg is fatal				
CIODRIN	pesticide	124	rat	110♂ 74♀						
				375♂) (dermal) 202♀)						
		173		125			451	rat		Inhibition of brain cholinesterase activity
COUMAPHOS (CO-RAL)	pesticide	124	rat	41♂ 16♀						
				860♂ (dermal)						
		349 451 252 173		90-110 100 56-230 13-180						
		174	bluegill		0.18					
		252	fathead		18					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

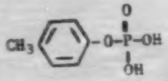
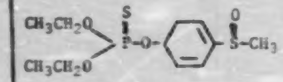
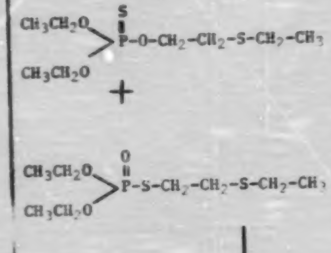
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
CRESYL DITHIO-PHOSPHATE	flotoreagent						233	rat	2.5 mg/kg daily	Histopathological changes in liver, kidney, heart & lung
										
DASANIT (BAYER 25141)	pesticide	124	rat	4.1♂ 1.8♀						
				19♂) (dermal) 4.1♀)						
										
DEMETON (SYSTOX, MERCAPTOPHOS)	pesticide	252	human	0.1 g/70 kg man is fatal			441	goldfish	0.1 mg/1	After 24 hr ChE decreased by 75%
		304 124	rat	7.5 6.2♂ 2.5♀			252	dog	2 mg/kg in diet	Inhibition of plasma cholinesterase
									5 mg/kg in diet	Inhibition of erythrocyte enzyme
				14♂) (dermal) 8.2♀)			252	cow	0.1 mg/kg in capsules for 3 days	Decrease in milk production; increase in percent fat
		451 49 252 173	rat	30 9.2 2.5-40 3-5					5 mg/kg in hay for 49 days	Adverse effects on weight gain; inhibition of red blood cell activity
		449	bluegill			0.195	252	sheep	1 mg/kg single dose	No toxic effects
		101 252, 449	fathead		3.6 3.6-4.2		451	human	0.1 g/70 kg	Fatal; inhibition of serum and erythrocyte activity

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

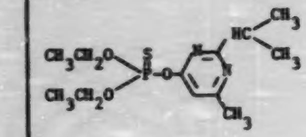
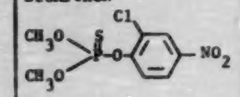
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
DIAZINON	pesticide	252	human	25.0 g/70 kg is fatal			441	goldfish	0.1 mg/l	40% decrease in cholinesterase activity after 24 hr
		124	rat	108-250♂ 76-285♀			252	dog	6.5 mg/kg daily	Inhibited cholinesterase activity
				200-900♀) (dermal) 455♀)					75.0 mg/kg in diet	Depression of red cell cholinesterase
		340		150-220						
		451		76-108						
		49		354						
		252		100-150 125 235						
		252	rat	435♂ 408 293						
		173		300-600						
		252	mouse	82						
DICAPTHON	pesticide	124	rat	400♂ 330♀						
				790♂) (dermal) 1250♀)						
		340		284-650						
		252		460						
		173		330-475						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

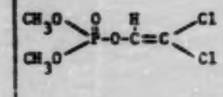
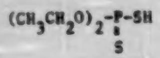
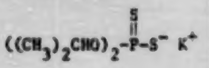
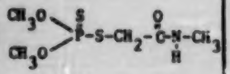
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					PHOSPHATE ESTERS					
DICHLORVOS (DDVP)	pesticide	124, 451	rat	80♂ 56♀			451			Inhibition of erythrocyte cholinesterase activity
		124		107♂) 75♀) (dermal)						
		340		56-80 25-30						
		8	guinea pig	80						
			rabbit	15.0						
DIETHYL DITHIOPHOSPHORIC ACID	intermediate in production of M-74 (pesticide)	119	mouse	1000-1250						
 $(CH_3CH_2O)_2\text{-}\underset{\overset{\parallel}{S}}{P}\text{-}SH$										
DIISOPROPYL DITHIOPHOSPHATE, K	used in ore flotation	118	mouse	2600			118	rabbit	5 mg/kg daily for 5 mos	No significant effects
			rat	2960						
 $((CH_3)_2CHO)_2\text{-}\overset{\overset{S}{\parallel}}{P}\text{-}S^-\ K^+$										
DIMETHOATE (CYGON, ROGOR)	pesticide	299	human	30			299	rabbit	5 mg/kg daily for 6 mos	Decrease in cholinesterase activity; hyperglycemia
		124	rat	28♂ 1959 30♀ 1959						
				61♂ 1959) 55♀ 1959) (dermal)						
				215♂ 1962 245♀ 1962						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

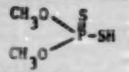
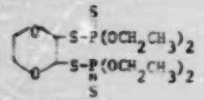
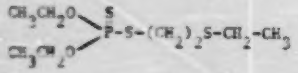
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
DIMETHOATE (Cont'd)		124	rat	610, 1962 (dermal)						
		340		155-220						
		451		250-265						
		173		200-300						
		449	bluegill			28.0				
			rainbow trout			20.0				
DIMETHYL-DITHIO-PHOSPHORIC ACID 							441	goldfish	0.1 mg/1	40% decrease in cholinesterase activity in 24 hr
DIOXATHION (HERCULES 528, DELNAV)	pesticide	124	rat	43♂ 23♀						
				235♂) (dermal) 63♀)						
		340		50						
		173		20-40						
DISULFOTON (DISYSTON)	pesticide	173	rat	4			388	rat	1 mg/kg daily	Tolerance of cholinesterase inhibition after prolonged exposure
		124		6.8♂ 2.3♀						
				15.0♂) (dermal) 6.0♀)						
		252		2.6-12.5						
			guinea pig	10.8						
		442	bluegill		0.064					
		252			0.07					
			fathead		2.6-3.7 2.9-4.1					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

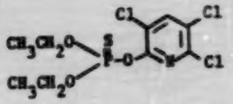
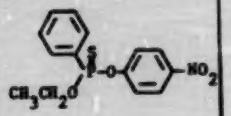
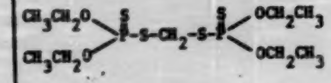
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
DURSBAN	pesticide	124	rat	155♂ 82♀			379	rat		Dursban itself is not a cholinesterase inhibitor; oxygen analog is a potent inhibitor
				202♂ (dermal)						
		340 173		97-276 135-163						
EPN	pesticide	252	human	0.3 g/70 kg is fatal			441	goldfish	0.1 mg/1	50% decrease in cholinesterase activity after 24 hr
		251	rat	36♂ 7.7♀			252	rat	225 and 450 mg/kg in diet 2 yrs	Retarded growth
				230♂) (dermal) 25♀)				dog	2 mg/kg daily for 1 yr	Increased weight of kidney
		340 49 252 173		7-65 23 7-50 8-17						
		101	fathead		0.2					
		442	bluegill		0.10					
ETHION	pesticide	124	rat	65♂ 27♀						
				245♂) (dermal) 62♀)						
		173		13-34						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

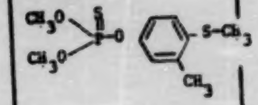
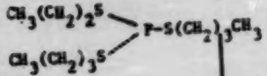
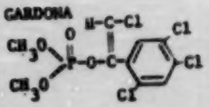
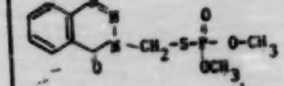
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
FENTHION (ENTEX, BAYTEX, TIGUVON)	pesticide	124	rat	215♂ 245♀			451	rat		Decrease in brain cholinesterase activity
				330 (dermal)						
		340		178-310						
		451		215-245						
		173		200						
FOLEX (MERPHOS)	pesticide	124	rat	1475♂ 910♀						
				690♂) (dermal) 615♀)						
GARDONA 	pesticide	124	rat	1125♀ >4000 (dermal)						
GUTHION (AZINPHOSMETHYL, BAYER 17147, DBD)	pesticide	252	human	0.2 g/70 kg is fatal			441	goldfish	0.01 mg/1	50% decrease in cholinesterase activity
		124	rat	13 11						
				220 (dermal)						
		49		24						
		252		11-80						
		173		7-13						
		252	mouse	20						
		174	bluegill		0.0052					
		252			0.005					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

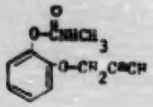
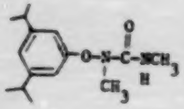
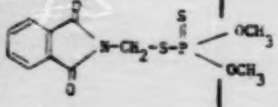
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
HERCULES 9699 	pesticide	124	rat	108♂ 60♀ >2400 (dermal)						
HRS-1422 		124	rat	280 200 >2400 (dermal)						
IMIDAN (PROLATE) 	pesticide	124	rat	113♂ 160♀ >2000♂) (dermal) >1550♀)						
		173		113-230						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

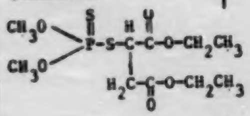
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
MALAOXON:	pesticide metabolite						299	guinea pig, mouse, & rat		Inhibition of malathion-esterase activity
SUCCINATE MALAOXON		62	mouse	243 66*						
MALONATE MALAOXON				215 80*						
α-GLUTARIC MALAOXON				47.2 10.7*						
β-GLUTARIC MALAOXON				449.1 379.7*						
d-MALAOXON		150		163 40*						
l-MALAOXON				249 100*						
dl-MALAOXON				243 66*						
			* Tri-o-tolyl phosphate given 24 hrs before testing mice to prevent degregation of the compound by carboxylesterases							
MALATHION (KARBOFOS)	pesticide	252	human	60 g/70 kg is fatal			441	goldfish	0.1 mg/l	65% inhibition of cholinesterase activity in 24 hrs
 CH_3O, CH_3O > $\overset{S}{\overset{\|}{P}}$-S-$\overset{H}{C}$-$\overset{O}{\overset{\|}{C}}$-O-$CH_2CH_3$; H_2C-$\underset{O}{C}$-O-CH_2CH_3		173	rat	1400-1900			112	rat	1 mg/kg daily for 6 mos	No observable change in cholinesterase activity of serum or in sugar response curves
		304		1500						
		124		1375♀ 1000♂ >4444 (dermal)			451	rat		Inhibition of cholinesterase activity in brain
		340		900-5800						
		451		940-1200						
		49		2590						
		252		1000-2830 1845						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
MALATHION (Cont.)										
SUCCINATE MALATHION		62	mouse	1942 159*						
MALONATE MALATHION				3090 159*						
α-GLUTARIC MALATHION				514 30.8*						
β-GLUTARIC MALATHION				3760 183*						
d-MALATHION		150		1014 132*						
l-MALATHION				2357 189*						
dl-MALATHION				1942 159*						
MALATHION		252		3321						
		174	channel cat		13.05					
		101	fathead		12.5					
		252	salmon fingerling		0.12					
		449	rainbow trout			0.1				
		252	red-sided shiner		8.9-9.6					
		449	bluegill			0.12				
		442			0.090					

* Tri-o-tolyl phosphate given 24 hrs before treating with compound to prevent degredation of the compound by carboxylesterases

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

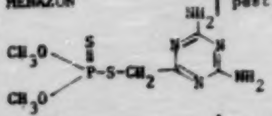
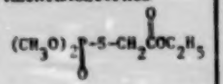
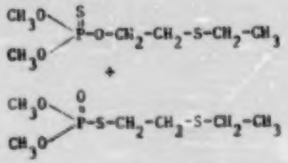
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
MENAZON 	pesticide	124	rat	1020♂ 1450♀ >2000 (dermal)			124	rat	0.075 mg/kg daily for 10 mos	No observable changes in growth; conditioned reflexes, cholinesterase activities, phosphate metabolism, SH concentration
		173		1200-1600						
METHYLACETOPHOS  $(CH_3O)_2P(O)-S-CH_2C(O)OC_2H_5$	pesticide	202	rat	38						
			mouse	322						
			guinea pig	214						
			rabbit	423						
METHYLDEMETON (METHYL SYSTOX, THIOMETON) 		173	rat	50-75			47	rat	0.008 mg/kg daily	Affected conditioned reflexes
									0.08, 0.8, & 8.0 mg/1 in drinking water & by stomach tube for at least 6 mos	Decrease in hemoglobin; decrease in erythrocyte count; increase in leukocyte count; traces of protein in urine; no changes in internal organs
							6	rabbit	1 mg/kg daily for 6 mos	Increase in erythrocyte count; increase in leukocyte count; decrease in cholinesterase activity

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

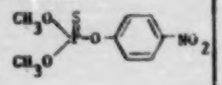
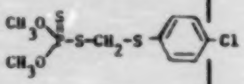
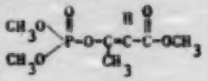
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
METHYLPARATHION (METAPHOS)	pesticide	252	human	0.15 g/70 kg is fatal			252	dog	50 mg/kg in diet	Decrease in plasma and erythrocyte cholinesterase activity
		124	rat	14♂ 24♀ 67 (dermal)					20 mg/kg in diet	Decrease in erythrocyte and possible decrease in plasma cholinesterase activity
		252 173		9-25 12-16			231	rat & rabbit	1 mg/kg daily for 6 mos	Change in conditioned reflexes; vacuolization of some brain cells
		101 252	fathead		8.3 7.5-8.3					
		442	bluegill		1.9					
METHYL TRITHION	pesticide	124	rat	98♂ 120♀						
				215♂) (dermal) 190♀)						
		173		98-200						
MEVINPHOS (PHOSDRIN)	pesticide	369 124	rat	6.1♂ 3.7♀			451	human		Inhibition of cholinesterase activity of erythrocytes
				4.7♂) (dermal) 4.2♀)			369	rat		Some cumulative effects
		451 49 252 173		4-6 6.5 6-13.1 3-5						
		252	bobwhite quail	90						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

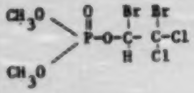
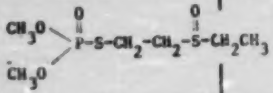
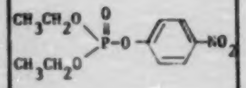
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					PHOSPHATE ESTERS					
NALED **(DIBROM)**	pesticide	124	rat	250♂ 800♀						
		173		430						
		449	bluegill			0.220				
			rainbow trout			0.070				
OXYDEMETONMETHYL	pesticide	124	rat	47♂ 52♀						
				173♂) 158♀) (dermal)						
		173		57						
PARAOXON	pesticide	451	rat	3.0			451	rat		Inhibition of cholinesterase activity in brain
		252		3.5						
		174	fathead		0.33			human		Inhibition of cholinesterase activity in erythrocytes
		449			0.25-0.33					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

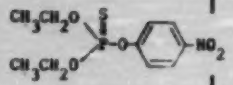
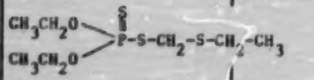
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					PHOSPHATE ESTERS					
PARATHION (THIOPHOS)		252	human	0.1 g/70 kg is fatal			441	goldfish	0.1 mg/l	40% decrease in cholinesterase activity after 24 hrs
		173	rat	3-6			239	rabbit	1.0 & 5.0 mg/kg daily for 6 mos	Fluctuation in cholinesterase activity; chronaxy changes in flexor-extensor muscles; decrease in rate of weight gain
		124		13.0♂						
				3.6♀						
				21.0♂						
				6.8♀						
		252		3-15					5.0 mg/kg daily for 6 mos	Non-specific granular edema changes in parenchymatous organs
		451		6.5						
		49		8.1						
		304	mammal	5-10				human		72 deaths caused by pesticides; 44 were due to organophosphates and 33 of these due to parathion
		449	bluegill			0.056				
		442			0.095					
		174	fathead		1.4-2.7					
		383			1.4					
		449	rainbow trout			2.0				
		252	caddisfly		0.001					
			Acroneuria pacifica		0.0001					
			Peteronarcys califorinica		0.0032					
PHORATE	pesticide	252	rat	2.3♂						
				1.1♀						
				6.2♂) (dermal)						
				2.5♀)						
				2-3						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

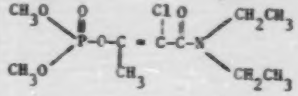
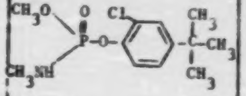
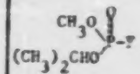
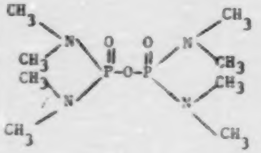
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
PHOSPHAMIDON	pesticide	124	rat	24						
				143♂) 107♀) (dermal)						
		451		7.5-10						
		173		15						
		449	bluegill			0.056				
			rainbow trout			2.0				
RUELENE	pesticide	124	rat	635♂ 460♀						
		340		950						
		173		460-1000						
SARIN	nerve gas, pesticide	252	human	0.01 is fatal						
										
SCHRADAN (OMPA)	pesticide	124	rat	9.1♂ 42♀			252	rat	50 mg/kg in diet	Poisoning and diminished growth in males but not females
				15♂) 44♀) (dermal)					≥1 mg/kg	Some cholinesterase inhibition
		304		20						
		173		5						
		174	fathead		121.0					
		252			121-135					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

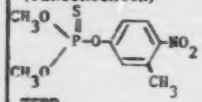
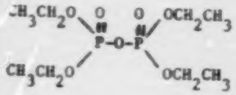
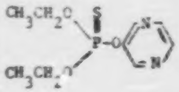
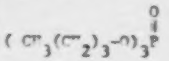
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
SD-7438	pesticide	124	rat	320♂ 265♀						
S,S'-benzylidene bis-(O, O-dimethyl phosphorodithioate)				>5000 (dermal)						
SUMITHION (FENITROTHION)	pesticide	124	rat	740♂ 570♀						
				300-400 (dermal)						
		173		250-673						
TEPP	pesticide	124	rat	1.05♂ 2.4♀			252	rat		Inhibition of cholinesterase activity in brain
		340		0.5-2.0				human	25 mg	Causes severe nervous symptoms
		451		2.0						
		173		0.5						
		174	fathead		1.7					
		252			1.0					
		174	channel cat		1.6					
		252	human	0.05 g/70 kg is fatal						
THIONAZIN	pesticide	124	rat	6.4♂ 3.5♀						
				17.0♂) 11♀) (dermal)						
		173		9-16						
TRIBUTYL PHOSPHATE		469	rat	1400						
 $(CH_3(CH_2)_3-O)_3P=O$			mouse	1200						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

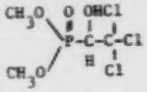
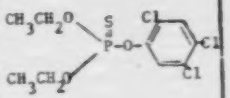
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHOSPHATE ESTERS						
TRICHLORFON (DIPTEREX, DYLOX) 	pesticide	252	human	25 g is fatal to 70 kg man						
		124	rat	630 560						
				>2000 (dermal)						
		340 252 173		500 400-1100 650						
		449 442	bluegill		3.8	5.6				
		174	fathead		180					
		449	rainbow trout			26.0				
TRICHLORONATE (BAYER 37289) 	pesticide	124	rat	55♂ 34♀						
				180♂) (dermal) 64♀)						
				ALDEHYDES AND KETONES						
ACETALDEHYDE CH_3CHO	manufacture of plastics, synthetic rubber, dyes & other chemical products						15	warm blooded animals	0.5 mg/kg	Ineffective dose during sanitary-toxicological tests

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

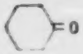
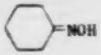
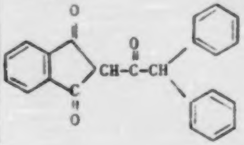
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ALDEHYDES AND KETONES					
ACETONE CH_3COCH_3	wastes from chemical industries, gas plants, coal tar processes, or paint manufacturing	252	rat		9750					
		174	sunfish		14,250 (toxic in 1 hr) 15,050 mg/l					
		435	mosquito fish		13,000					
		88	D. magna		10 (48 hr)					
ACROLEIN (F-98) $CH_2=CHCHO$	pesticide	252 173	rat	46 42-46						
		252	rabbit	7.1						
		174	chinook salmon		0.08 (24 hr)					
BUTYRALDEHYDE $CH_3CH_2CH_2C{\overset{O}{\lt}}_{H}$							292	warmblooded animals		Change in conditioned reflexes; change in blood serum composition
CYCLOHEXANONE 	effluent from production of caprolactam, resins, and from distillation of cyclohexanone raw materials	422	rabbit	1000-1600 (MLD)						
CYCLOHEXANONE OXIME 	intermediary compound in production of caprolactam						351	rabbit	0.5 and 5.0 mg/kg/day for 6 mos	Decrease in blood catalase activity
DIPHACINONE 	pesticide	124	rat	1.9						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

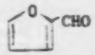
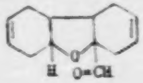
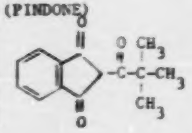
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				ALDEHYDES AND KETONES						
FORMALDEHYDE	occurs in tannery wastes, penicillin wastes, and effluent from manufacture of plastics and resins	252	rat	800			287			No significant effects on the animals studies
HCHO			channel cat		25					
		88	D. magna		>100 <1000 (24 hr)					
FURFURAL	used in manufacture of plastics, as a solvent in petroleum refining, in the manufacture of varnishes and as a pesticide	220	mouse	425			220	rat	25 mg/kg/ day for 4 mos	No significant effect
$C_5H_4O_2$			rat	126.7						
		252	dog	2300						
		200	guinea pig	541.7						
		435, 449	mosquito fish		24					
		252	bluegill		24					
METHYL ETHYLKETONE	solvent for resins, nitro, and acetylcellulose	252	rat	3980			442	warmblooded animals		No significant effects
			bluegill		5640 (48 M)					
$CH_3COC_2H_5$		435	mosquito fish		5600					
MGK REPELLENT 11 	pesticide (repellent)	340	rat	2500						
PIVAL (PINDONE) 	pesticide	124	rat	280						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

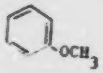
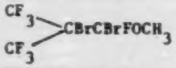
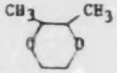
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ETHERS					
ANISOLE 	in waste waters from synthesis of analogs and derivatives of DDT; trace amounts in BKME waste	283	mouse	1150			283	rabbit	0.025 mg/kg daily for 6 mos	Change in blood sugar curve
DIBROMOHEPTAFLUORO-ISOBUTYL METHYL ETHER  $(CF_3)_2CBrCBrFOCH_3$	refrigerant, propellent, fire extinguisher, solvent	106	rat	1150						
DIETHYL ETHER CH_3CH_2-O-CH_2CH_3							14	warmblooded animals	0.2 mg/kg daily	Ineffective dose during sanitary toxicological tests
DIMETHYLDIOXANE $C_6H_{12}O_2$ 							193, 193	laboratory animals	0.005 mg/kg daily	Does not affect functional condition
							192	rabbit	0.25 mg/kg daily for 6 mos	Decrease in hemoglobin concentration; decrease in blood sugar; change in glycogenic liver function
								rat	0.0025 mg/kg daily for 6 mos	Change in rate of O_2 consumption; change in conditioned reflexes

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

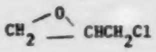
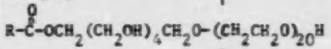
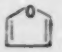
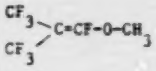
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ETHERS					
EPICHLOROHYDRIN 	manufacture of epoxy resins	105	rat	141.1			105	rabbit	0.5 mg/kg daily for 6 mos	Low concentration of reduced glutathione 15 days after beginning of administration and a higher concentration of oxidized glutathione toward the end; change in reticulocyte number; decrease in vitamin C in liver, kidneys, and spleen
			mouse	194.6						
			guinea pig	280						
			rabbit	345						
									0.05 mg/kg daily for 6 mos	Similar effects as above
								rat	0.005-5 mg/kg/day	Affected conditioned reflexes
									0.005-5 mg/kg/day	Decreased synthesis of hippuric acid
FATTY ACYL SORBITAN EO (20)  $R-\overset{O}{\overset{\|}{C}}-OCH_2(CH_2OH)_4CH_2O-(CH_2CH_2O)_{20}H$	surfactant	397	rat	20,000-60,000+						
			mouse	25,000+						
			hamster	18,000						
FURAN 	organosynthetic industry						343	rat	0.2-50 mg/kg daily for 3 mos	Liver damage from only the peripheral lobes at the lower dose to atrophic annular cirrhosis at the higher dose
HEPTAFLUOROISOBUTYLENE METHYL ETHER 	refrigerant propellent, fire extinguisher	106	rat	1070						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

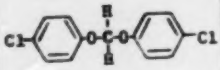
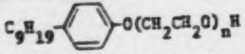
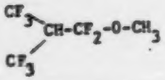
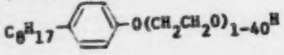
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				ETHERS						
HEXAFLUOROPROPYL METHYL ETHER $CF_3CHF-CF_2O-CH_3$	refrigerant, propellent, fire extinguisher	106	rat	~30,000 (IP)						
LAURYL ALCHOHOL EO $CH_3(CH_2)_{10}CH_2O(CH_2CH_2O)_nH$	surfacant	397	mouse rat	1170-7600 4150-9350						
NEOTRAN 	pesticide	252	rat channel cat	5800	 21.8		252	rat	100 mg/kg in diet 50 days 3000 mg/kg in diet 50 days	No effect Pronounced histo-pathology
NONYL PHENOL EO 	surfacant	397	rat	1600						
OCTAFLUOROISOBUTYL METHYL ETHER 	refrigerant, propellent, fire extinguisher, solvent	106	mouse	>1000						
OCTYLPHENOL EO (1-40) 		397	rat	1600-28,000 +						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

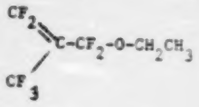
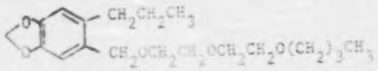
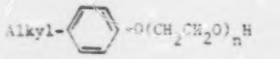
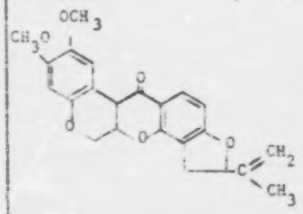
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					ETHERS					
PERFLUOROISOBUTENYL ETHYL ETHER 	waste product from synthesis of fluorine containing plastics	364, 370	mouse	164			364	rabbit	6 mg/kg daily for 7 mos	Change in blood composition; decrease in prothrombin time; affects glycogenic function of liver
								rat	6 mg/kg daily for 7 mos	Decrease in O_2 consumption weight loss, histological, histochemical and neurohistological changes
									0.15 mg/kg for 7 mos	Decrease in conditioned reflexes
PIPERONYL BUTOXIDE 	pesticide synergist	124	rat	7500♂ 6150♀						
				>7950 (dermal)						
		340		11,500						
POLYETHYLENE-CYCLOALKYL PHENYL ETHERS (OP-7, OP-10) 	detergents						132	rat	150 mg/kg OP-10 daily for 4 mos	Increase in weight of kidney fatty dystrophic liver changes
								mouse	4% (400 mg/1) OP-7 daily for 55-62 days	No changes
ROTENONE 	pesticide	252	human	0.2 g/kg is fatal			252	rat	5 mg/kg in diet daily	Necrosis of the liver
		340	rat	132-1500						
		252		132						
		449	bluegill			0.024				
		252	fathead		0.006-0.066					
			catfish		0.47					
		449	rainbow trout			0.032				

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

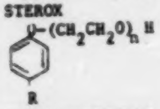
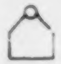
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ETHERS					
SAPONIN	industrial effluent; charging fire extinguishers; detergents						216	rat	1, 10, and 50 mg/kg daily for 3-4 mos	Affected conditioned reflexes; change in nerve cells
$C_{30}H_xO_y(-C_6H_{11}O_5)_z$									10 and 50 mg/kg daily for 4 mos	Histological changes in liver and kidneys
STEARYL ALCOHOL EO		397	rat	2900 25,000 +						
$C_{18}H_{37}O(CH_2CH_2O)_nH$										
STEROX 	detergent	174	silver salmon		20 mg/l (80% kill: in 22 hrs)					
TETRAHYDROFURAN		319	rat	2300			320	warmblooded animals	>5 mg/l in drinking water daily	Pathological changes
			mouse	3000						
			guinea pig	2300			319	mouse, rat, rabbit	20 mg/kg daily for 5-6 mos	Decrease in conditioned reflexes; increase in reticulocytes; decrease in cholinesterase activity; increase in liver glycogen
									10 mg/kg daily for 5-6 mos	Growth impairment

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

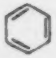
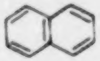
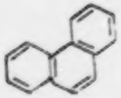
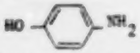
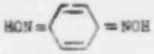
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				UNSUBSTITUTED AROMATICS						
BENZENE	tar and gas waste, dying and other textile operations	252	rat	5600 5700						
		174	sunfish		35-37 (lethal in 1 hr)					
		435	mosquito fish	386						
NAPHTHALENE 	tar and gas waste; refinery textile mill and other industrial waste	124	rat	2000♂ 2400♀ >2500 (dermal)						
		174	sunfish		4-5 (lethal in 1 hr)					
			perch		20-40 (lethal in 1 hr)					
		435	mosquito fish		150					
PHENANTHRENE		333	mouse	700						
		174	sunfish		1-2 (lethal in 1 hr)					
				PHENOLS AND QUINONES						
p-AMINOPHENOL 							410	rat	0.05 mg/kg daily for 7 mos	Ineffective dose
BENZOQUINONE DIOXIME 		45	rat	1580						
			mouse	1420						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

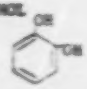
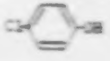
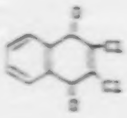
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					PHENOLS AND QUINONES					
CATECHOL 		174	perch		20 (fatal in 1 hr)					
CHEREMKHOVSK TAR - INTERMEDIATE FRACTION (high MW phenols 30%, hydrocarbons 50%, neutral oxycompounds 15%)	semi-coking of coal	211	mouse	1360			211	guinea pig	100 mg/kg daily for 4 mos	Loss of weight; increase in weight of adrenals; change in electrocardiogram; change glycemic curves
									10 mg/kg daily for 4 mos	Change in glycemic curves
CHLOROPHENOL 	petrochemical	174	bluegill		8.1					
DICHLONE (PHYGON) 	pesticide	252	rat	1500			252	human		Skin irritation
			coho salmon		0.42 (48 hrs)			rat	1580 mg/kg in food	Retarded growth
			channel cat		0.34					
			fathead		0.15					
		252, 449	largemouth bass		0.07 (48 hrs)					
		252	rainbow trout		0.074					
			red-sided shiner		0.111					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

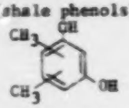
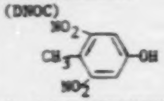
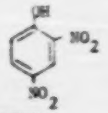
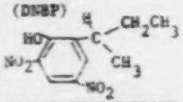
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
				PHENOLS AND QUINONES						
DIMETHYLRESORCINOLS (shale phenols) 	carbonization of oil shales; production of tanning compounds	420	rat	1000			420	rat	100 mg/kg daily for 20 wks	Decreased weight Affected kidneys and liver
DINITROCRESOL (DNOC) 	pesticide	173	rat	25-40						
2, 4-DINITROPHENOL	pesticide, production of dyes	316	rat	31.2			316	rat	0.031 and 0.62 mg/kg for 7 mos	Decrease in conditioned reflexes; changes in content of urea; decrease in content of high-energy phosphorus compounds in the liver
			mouse	46.5						
			guinea pig	81.0						
			rabbit	30				rabbit	0.03 mg/kg for 7 mos	Decrease in SH groups
DINOSEB (DNBP) 	pesticide	173	rat	50						
DIPHENYLOLPROPANE $(CH_3)_2C(C_6H_4OH)_2$							104	rat	0.25 mg/kg daily for 6 mos	Change in acid resistance of erythrocytes; decrease in ascorbic acid concentrations; Also affects: oxidation-reduction processes, SH-groups of reactive proteins, the liver function, the neurohormonal regulation and the central nervous system

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

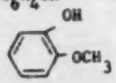
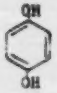
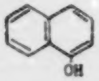
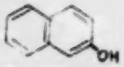
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHENOLS AND QUINONES						
GUAIACOL $CH_3OC_6H_4OH$ 	tar and gas wastes, component of BKME	174	perch		70-80 (48 hr)					
HYDROQUINONE $C_6H_4(OH)_2$ 	anti-oxidant, as a reducer in photographic development and as a chemical reagent in phosphate tests	252	rat	320			271	warmblooded animals		Considerable effect on bone marrow
			goldfish		0.287 (48 hrs)					
∝-NAPHTHOL 	waste from dye and insecticide industry; also from plants engaged in distillation of bituminous coal	331, 332	rat	2400						
			mouse	280						
			guinea pig	2000						
			rabbit	9000						
			cat	134						
β-NAPHTHOL 	waste from dye and insecticide industry; also from plants engaged in distillation of bituminous coal	331, 332	rat	1960			331	rat	4.4 mg/kg daily for 8 mos	Changes in CNS function; change in conditioned reflexes; decrease in cholinesterase activity
			mouse	96						
			guinea pig	1335						
			rabbit	5400					196.0 mg/kg /day for 8 mos	Decrease in cholinesterase activity; increase in prothrombin time; decrease in SH groups; decrease in phagocytic activity of leucocytes
		252		3800						
		331	cat	89						
									12.0 mg/kg /day for 3 mos	Change in glycogenic function of liver

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

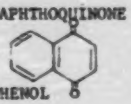
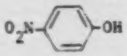
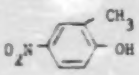
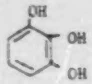
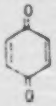
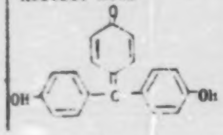
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					PHENOLS AND QUINONES					
1, 4-NAPHTHOQUINONE 		400		2000 (lethal)						
NITROPHENOL 		236	laboratory animals	328			236	warmblooded animals		Alterations in functional state of organism
		449	bluegill		46.3 (48 hrs)					
NITROTOLUOL 		204	rat	2400			215	rat	120 mg/kg daily	Increase in number of leucocytes, and methemoglobin blood levels; decrease in erythrocytes and hemoglobin level; affects liver; raised prothrombin index
			mouse	330						
			rabbit	2400						
PYROGALLOL $C_6H_3(OH)_3$ 	used in dyeing of woolens, & furs, for staining leather, and as a developer in photography	252	dog	25						
			goldfish		18 (48 hr)					
QUINONE 	used in photography, dye manufacture, tanning, and as an oxidizing agent	252	rat	130						
ROSOLIC ACID 	tar and gas waste	250	perch		100 (lethal in 1 hr)					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

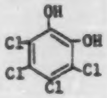
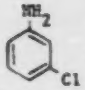
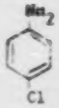
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				PHENOLS AND QUINONES						
TETRACHLOROCATECHOL 	possible component of Kraft pulp mill bleach waste	362	fish	sub-lethal concentrations caused an increase in rate of respiration which was thought to indicate disruption of cellular processes by uncoupled oxidative phosphorylation						
VETLUZHSK OIL (25-37% high MW phenols & esters, 10-15% aromatic acids, 10-15% fatty acids, 20% hydrocarbons)	wood resin distillation; used as a flotoreagent in concentrating iron ore of low magnetic content	111	mouse	624-2850			111	guinea pig	100 mg/kg daily	Decrease in O_2 consumption; adrenal hypertrophy shifts in form of shortened B-P intervals and changes in QRST complex revealed by electrocardiograms; histological changes in liver and kidneys
									10 and 100 mg/kg daily for 4 mos	Effect on glycogen synthesizing function of the liver
				AROMATIC DERIVATIVES						
HALOGENATED										
m-CHLOROANILINE 	agricultural and chemical effluent	186	rat	1084 ♀ 880 ♂			230, 237	rat	25 mg/kg daily for 8 mos	Decrease in hemoglobin & erythrocytes; increase in reticulocytes; decrease in liver glycogen; change in CNS; histological changes in liver and kidney; increase in vitamin C content of suprarenals.
		230		256						
		136	mouse	1100						
		230		368						
		186	guinea pig	750						
		230		250						
p-CHLOROANILINE 	agricultural and chemical effluent	186	rat	370 ♀ 300 ♂			186	guinea pig	5 mg/kg daily for 7 mos	Glycogenic malfunction of the liver; decrease in phagocytic activity of leucocytes
			mouse	400						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

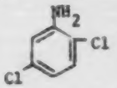
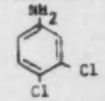
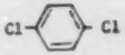
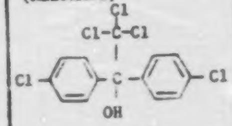
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AROMATIC DERIVATIVES					
p-CHLOROANILINE (cont)		186	guinea pig	350			186	guinea pig	0.5 and 5 mg/kg daily for 8 mos	Protein dystrophy in liver
								rat	0.1 mg/kg daily for 8 mos	Disturbance of conditioned reflexes
2, 5-DICHLOROANILINE 		347	rat mouse guinea pig rabbit	3000 2500 3750 3750			347	rat	20 mg/kg daily for 6 mos	Changes in conditioned reflexes, kidney and liver function and blood concentrations
3, 4-DICHLOROANILINE 		347	rat mouse guinea pig rabbit	700 1000 6750 675			347	rat	20 mg/kg daily for 6 mos	Changes in conditioned reflexes, kidney and liver function and blood concentrations
DICHLOROBENZENE 	insulator, plasticizer, pesticide	340	rat	500-5500			143	rat	0.003 mg/kg daily for 5 mos	No significant effects
DICOFOL (KELTHANE) 	pesticide	252 124	rat	575-1100 1100 ♂ 1000 ♀						
				1230 ♂) 1000 ♀) (dermal)						
		173		575->2000						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

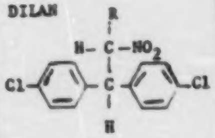
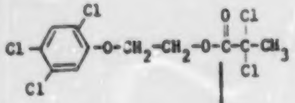
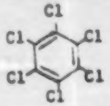
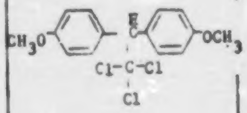
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					AROMATIC DERIVATIVES					
DILAN 	pesticide	124	rat	600 ♂ 475 ♀						
				>3000 (undiluted technical grade)						
		173		475-4000						
		174	channelcat		<0.5					
ERBON (BARON) 		449	chinook salmon		2.3 (48 hrs)					
		174	channelcat		6.9 (48 hrs)					
HEXACHLOROBENZENE 							143	rat	0.005 mg/kg daily for 4 mos	Changes in conditioned reflexes
METHOXYCHLOR 	pesticide	252	human	350,000 (fatal to 70 g man)			252	quail	1000 mg/kg in diet	40% reduction in reproduction
		293	rat	6000						
		252		5000-7000						
			bobwhite quail	22,000						
			ring neck pheasant	25,000						
		101	fathead		0.064					
		449				0.031				

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

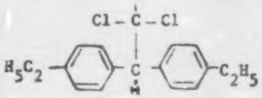
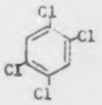
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AROMATIC DERIVATIVES					
METHOXYCHLOR (cont)										
		101, 174 449	bluegill		0.062	0.020				
		101	goldfish		0.056					
		174	guppies		0.120					
			rainbow trout		0.05 (24 hr)					
PERTHANE 	pesticide	124 340 252	rat	>4000 8170 8200 8500						
		449	bluegill			0.021				
			rainbow trout			0.009				
TETRACHLOROBENZENE 	pesticide; intermediate product in the manufacture of the effective fungicide copper trichlorophenolate	108	rat	1500			108	rat	0.005 mg/kg daily for 8 mos	Change in conditioned reflexes; increase in weight coefficients of the liver; decrease in SH groups
			mouse	1035 (in oil) 2650 (in starch)					0.05 mg/kg daily for 8 mos	Increase in ascorbic acid content of organs
			rabbit	1500				rabbit	0.05 mg/kg daily for 8 mos	Disorders of glycogen function of the liver; increase in SH groups in blood serum followed by a decrease; increase in hemoglobin content of blood; increase in content of reticulocytes in the peripheral blood

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

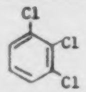
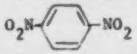
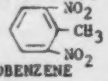
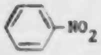
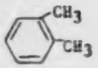
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AROMATIC DERIVATIVES					
TETRACHLOROBENZENE (cont.)							108	rabbit	0.005 mg/kg daily for 8 mos	Disorder of glycogen function of liver; change in content of SH groups in serum in last month of experiment
TRICHLOROBENZENE 	insulator, plasticizer, synthesis of some explosives						255	rat	0.01 mg/kg daily for 5.5 mos	Increase in eosinophiles, reticulocytes, and leucocytes in the blood; reduced O_2 consumption
							143		0.003 mg/kg daily for 7-8 mos	Did not affect conditioned reflexes
NITRO COMPOUNDS										
p-DINITROBENZENE 		252	rat	29.4						
DINITROTOLUENE (DINITROTOLUOL) 	aniline dye and other industries						126	rabbit	0.5 and 0.05 mg/kg daily for 8 mos	Histological changes in liver
NITROBENZENE $C_6H_5NO_2$ 	manufacture of aniline, soaps, and shoe polishes	252	rabbit	700						
XYLENE $C_6H_4(CH_3)_2$ 	solvent and cleaning agent; manufacture of dyes and organics	252	rat	4300			435	rat	4 and 48 mg/kg daily for 5 1/2 mos	Occasional variation in hemoglobin, erythrocytes, and leucocytes; marked eosinophilia; change in reticulocyte number
		124	sunfish		47-48 (lethal in 1 hr)					
		88	D. Magna		>100 <1000 (48 hrs)				48 mg/kg daily for 5 1/2 mos	Lymphopenia

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

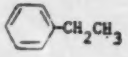
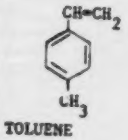
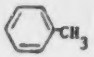
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					AROMATIC DERIVATIVES					
ARYLALKANES										
ETHYL BENZENE 							463	rabbit	5 g/kg in drinking water	Effect on: CNS, growth, morphological composition of blood, pathological and histological changes in organs
METHYLSTYRENE 		296	rat	10,500						
			mouse	5,000						
TOLUENE 	tar and gas waste	252	rat	7000			3	rabbit	0.25, 1.0 and 10 mg/kg for 9 1/2 and 5 mos	No significant effects
		3	man	effect:	headache, intoxication, nausea. vomiting, disturbance of equilibrium, paresthesia, loss of conscience					
		174	sunfish		61-65 (lethal in 1 hr)					
		435, 449			1180					
				MERCAPTANS AND OTHER SULFUR ORGANICS						
BUTYL MERCAPTAN, Na $CH_3CH_2CH_2CH_2{-}S^-Na^+$	effluent from oil refineries	449	fish		7.3 (24 hrs)					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

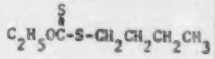
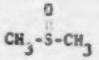
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				MERCAPTANS AND OTHER SULFUR ORGANICS						
BUTYL XANTHOGENATE  $C_2H_5O\overset{S}{\overset{\|}{C}}-S-CH_2CH_2CH_2CH_3$	flotoreagent	234	mouse & rat	600-800			435, 233	rat	1 mg/kg daily for 4 mos	Decrease in blood prothrombin, histopathological changes in liver and kidneys
							233		10 mg/kg daily for 4 mos	Change in conditioned reflexes
CARBON DISULFIDE CS_2		435	mosquito fish	135			424	rabbit	70 mg/kg daily for 6 mos	Change in phagocytic activity; change in carbohydrate metabolism
							201	rat & rabbit	15 mg/kg daily for 7 1/2 mos	Decrease in rate of weight gain in rabbit only; decrease in cholinesterase activity; decrease in blood
DIMETHYLSULFIDE $(CH_3)_2S$	waste from production of cellulose by sulfate method	201	rat	3300						
			mouse	3700						
DIMETHYLSULFOXIDE  $CH_3-\overset{O}{\overset{\|}{S}}-CH_3$		201	chinook salmon	12,000			201	fish	high concentration or over a long period of time	Change in number of various blood components; histopathological change in liver, kidney, brain, gills, and spleen
			sockeye salmon	13,000						
			coho salmon	16,000						
			rainbow trout	17,000						
METHYL MERCAPTAN CH_3SH	bleached Kraft pulp mill effluent						449	fish	1 mg/1	Restlessness, a progressive respiratory depression, muscular weakness, convulsions, spastic paralysis

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

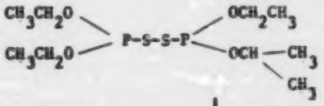
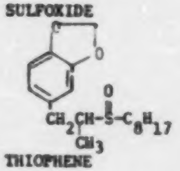
Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
				MERCAPTANS AND OTHER SULFUR ORGANICS						
MUSTARD GAS $ClCH_2CH_2SCH_2CH_2Cl$	chemical warfare agent	252	rabbit	500 mg/1 causes gastrointestinal inflammation						
			guppy	20 mg/1 fatal in 15 min						
PHOSTEX 	pesticide	124	rat	350 ♂ 265 ♀ 480 ♂) (dermal) 500 ♀)						
SULFOXIDE 	synergist	340	rat	500-5000						
THIOPHENE C_4H_4S 	organosynthetic industry, tar and gas waste	174	sunfish		27 (fatal in 1 hr)		343	rat	10 mg/kg daily for 4 mos.	Change in conditioned reflexes
				ORGANOMETALICS						
DIETHYLMERCURY $CH_3CH_2HgCH_2CH_3$	effluent from synthesis of ethyl mercuric chloride and phosphate	458	rat	51.2			458	rabbit	0.0005-0.005 mg/kg daily for 6 mos	Decrease in blood serum SH groups in rabbits; disturbance in liver parenchyma
								rat	0.000005-0.00005 mg/kg daily for 6 mos	Higher doses disturbed catalase activity; higher dose affected conditioned reflexes
								rat & rabbit	0.005 mg/kg daily for 6 mos	Histopathological changes in liver and kidneys

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/l	LC50 mg/l	Ref	Species	Dose	Effect
					ORGANOMETALLICS					
ETHYLMERCURIC CHLORIDE CH_3CH_2HgCl		458	rat	211.8			458	rabbit	0.0005-0.005 mg/kg daily for 6 mos	Decrease in blood serum SH groups
								rat	0.000005-0.00005 mg/kg daily for 6 mos	Higher dose affects conditioned reflexes
								rat & rabbit	0.005 mg/kg/day for 6 mos	Histopathological changes in liver and kidneys
TETRAETHYL LEAD $Pb(C_2H_5)_4$	effluent from crude oil distillation plants	449	bluegill		0.20					
TETRAETHYL TIN $Sn(C_2H_5)_4$		371	rat	15.9			371	rat & guinea pig	0.0001 mg/kg daily for 7-9 mos	Decrease in hemoglobin; decrease in erythrocyte count; decrease in cholinesterase activity; increased leucocyte count; change in kidney function; change in conditioned reflexes
			mouse	39.8						
			guinea pig	37						
			rabbit	7						
					POLYMERS					
BUTOXY POLYPROPYLENE GLYCOL (CRAG FLY REPELLENT, OPS-B) $C_4H_9O(CH_2\underset{CH_3}{C}HO)_nH$	pesticide, flotore-agent	340 49	rat	9100-11,200 17,000			308	rat	400 mg/kg daily for 6 mos	Change in cholinesterase activity
									7-400 mg/kg daily for 6 mos	Change in conditioned reflexes

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					POLYMERS					
METHOXYPOLYPROPYLENE GLYCOL (OPS-M)	flotoreagent						308	rat	2.5 mg/kg daily for 6 mos	Change in conditioned reflexes; change in cholinesterase activity
METHYL SILICONATE		212	mouse	3900			308	guinea pig	25 mg/kg daily for 6 mos	Slight protein distrophy in liver and kidneys
POLY(ETHYLHYDRO-SILOXANE	water repellent						308	rat	≤80 g/kg	no toxic effect
POLYMETHACRYLATE, cationic (VA-102)	used for purification of water						408	rat	1 g/kg daily for 30 days	Decrease in CNS; change in vegetative nervous system
POLYSTYRENE, cationic (VA-2, VA-3)	flocculant for water purification	425	laboratory animals	1500-3000			425	rat	0.1 mg/kg daily for 10 mos	Slight change in conditioned reflexes; change in stomach histology; increase in eosinophiles
					SURFACTANT (structure unknown)					
ACTUSOL	oil dispersant	407	fingerling steelhead		24.0					

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					SURFACTANTS					
BLAST	detergent				(Structure unknown)		174	fish	high concentration	Fatal due to alkalinity of solutions; exhibited symptoms of distress, and at death were excessively slimy with opaque corneas
CHEVRON NI-O	oil dispersant	407	fingerling steelhead	3.2						
COREXIT-7664	oil dispersant	407	fingerling steelhead	15.8						
E-314	oil dispersant	407	fingerling steelhead	22.5						
F. O. 300B	oil dispersant	407	fingerling steelhead	65.0						
GAMLEN-CW	used to precipitate paint from the surface of water	174	chinook salmon	10-17.8 (critical level)			174	fish		Irritation and intoxication, including spasmodic snapping of the jaws, violent activity and twitching of eyes and fins
HOLL-CHEM 662	oil dispersant	407	fingerling steelhead	3.2						
JAN-SOLV-60	oil dispersant	407	fingerling steelhead	35.5						
PETROLITE W-1439	oil dispersant	407	fingerling steelhead	35.5						
POLYCOMPLEX A-11	oil dispersant	407	fingerling steelhead	13.0						
SEASWEEP	oil dispersant	407	fingerling steelhead	20.2						

TABLE III (CONT.) - ACUTE AND CHRONIC TOXICITY OF POTENTIAL ORGANIC POLLUTANTS

Agent	Source	Acute Toxicity					Chronic Toxicity			
		Ref	Species	LD50 mg/kg	96 hr TLm mg/1	LC50 mg/1	Ref	Species	Dose	Effect
					SURFACTANTS (Structure unknown)					
SPILL-X	oil dispersant	407	fingerling steelhead	35.5						
					ORGANICS (Structure Unknown)					
ALGIBIOL	pesticide	251	fathead		20 (24 hrs)					
C 56	pesticide	174	bluegill		30 (48 hrs)					
			largemouth bass		35 (48 hrs)					
MEZIDINE	aniline dye intermediate						28	rat	small doses	Changes of the hemopioetic and nervous systems and hepatic functions, oxidative and tropic processes of the body
SHELL D50	pesticide	174	rainbow trout		210 (48 hrs)					
SORICIDE TETRAMINOL	pesticide	251	fathead		8 (48 hrs)					

TABLE IV - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

This table contains available information on chemicals the concentrations and effects of which have been examined in tissues. It will be noted that all information contained in this table refers to pesticides. The data indicates that pesticides can be stored in the tissues of humans normally exposed to pesticides and deaths have occurred as a result of accidental exposure which have resulted in high concentrations in tissue. In some instances sequential information was examined and shows that some pesticides had increasing concentrations with time in the US and in India, but not in England or in some cases in France. Information on animal tissues shows extremely high tissue concentrations in animals living in highly pesticide-treated areas while aquatic life generally indicate low concentrations as compared to man and terrestrial animals.

TABLE IV - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			ALKANES AND ALKENES	
	Halogenated			
83	BENZENE HEXACHLORIDE	man	normal exposure to pesticides during life	
			France	stored
			US	stored (< France)
84			normal exposure to pesticides	
			US 1961-62	0.20 ppm in body fat
			1962-63	0.57 " " " "
			1964	0.60 " " " "
			England 1963-64	0.42 " " " "
			1964	0.02 " " " "
			France 1961	1.19 " " " "
			India 1964	1.43 " " " "
315			normal exposure to pesticides	pregnant women: mean concentration in fat tissue 0.14 ppm " " blood " 0.0045 "
				non-pregnant women: mean concentration in blood tissue: 0.42ppm
				fetus " " " 0.0012 ppm
337			accidental contamination of seed grain (Turkey)	>3000 cases, 3-11% deaths (annually in different years)
71	CHLORDANE	fish (50 nationwide sampling stations)	normal exposure	storage in 22% of 590 samples

TABLE IV (CONT.) -- CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			ALKANES AND ALKENES	
	Halogenated			
91	DIELDRIN	human	normal exposure to pesticides	storage in adipose tissue
				0-5 years (white) range: < .05-.73 ppm (mean 0.23)
				6+ years (white) range: <.05-.77 ppm (mean 0.23)
				0-5 years (nonwhite) range: <.05-.46 (mean .21) 6+ years (nonwhite) range: <.05-.43 (mean .20)
			" " " in various locations	storage in adipose tissue
			US (3 cities) US (4 cities)	range .02-.36 ppm mean .15 ppm .07-2.82 " " .31 "
			India	< .02-.36 " " .03 "
			New Orleans	.03-1.15 " " .29 "
			England, Wales	< .10-.90 " " .26 "
			England	.10-.73 " " .22 "
			Chicago	.01-1.39 " " .14 "
			Toronto, Canada	.07-.53 " " .22 "
			Miami	< .05-.77 " " .22 "
83			normal exposure to pesticides	storage in fat
			England	0.21 ppm (mean)
			US	0.15 ppm (mean)
84			normal exposure to pesticides	storage
			US 1961-62 1962-63 1964 1964	0.15 ppm in body fat 0.11 " " " " 0.31 " " " " 0.29 " " " "
			Denmark 1965	0.20 " " " "

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			ALKANES AND ALKENES	
	DIELDRIN	human	normal exposure to pesticides	storage
	(continued)		England 1961-62	0.21 ppm in body fat
			1963-64	0.26 " " " "
			1964	0.21 " " " "
			India 1964	0.04 " " " "
			Italy 1965	0.59 " " " "
84			general population, male, US, 1965	0.0014 ppm in whole blood
			" " " " "	0.0019 " " plasma
			" " female " "	0.0013 " " serum
			" " England, 1964	0.0014 " " whole blood
			occupational exposure, 1964	0.0463 " " " "
315			normal exposure to pesticides	storage
				pregnant women: mean conc. in fat tissue: 0.08 ppm mean conc. in blood: 0.0016 ppm
				nonpregnant women: mean conc. in blood: 0.17 ppm
				fetus: mean conc. in blood: 0.0013 ppm
50			normal exposure to pesticides during life (range: 28 weeks gestation to 88 years of age)	44 autopsies provided following mean values:
				perirenal fat: 0.0300 ppm of whole tissue
				mesenteric fat: 0.0630 " " "
				panniculus fat: 0.0270 " " "
				bone marrow: 0.0620 " " "
				TBLN*: 0.0190 " " "
				adrenal 0.0060 " " "
				kidney 0.0056 " " "
				liver 0.0037 " " "
				brain 0.0031 " " "
				gonad 0.0021 " " "

* tracheo bronchial lymph nodes

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			ALKANES AND ALKENES	
	DIELDRIN (continued)	human	normal exposure to pesticides during life (continued)	lung: 0.0022 ppm of whole tissue spleen: 0.0021 " " "
337			0; 0.05; 0.211 mg/man/day for two years (≤ 0.0028-0.0036 mg/kg/day)	only difference was increased concentration of dieldrin in adipose tissue, blood
125		fish bluegills redears goldfish white catfish	sublethal concentration followed by recovery period (up to 41 days)	stored in all tissues in varying amounts liver) gall bladder) pyloric caeca) intestine) high concentrations muscle low concentration
334		eagles	normal exposure to pesticides	storage bald eagles: carcass: (median value) 1965 1964 0.33 ppm 0.65 ppm liver: 0.21 " 0.35 " brain: 0.08 " 0.10 " gold eagles: carcass: 1964-65 0.09 ppm liver " threshold brain " "
71		fish from 50 nationwide sampling stations	normal exposure to pesticides	storage in 75% of 590 samples (≤ 1.94)
337		fish	poor handling in sandfly control (Wisconsin or boundary waters)	range: trace 12.5 ppm of whole fish average: 0.158 ppm " " "

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			ALKANES AND ALKENES	
140	DIELDRIN (continued)	hen pheasants	4 mg/week	average: 41.2 ppm in fat had no adverse effect on feeding, weight or egg production
84	ENDRIN	man	normal exposure to pesticides	storage
			US 1964	< 0.02 ppm in body fat
			1964	< 0.03 " " " "
			England 1964	< 0.02 " " " "
			Italy 1965	0.93 " " " "
334		bald eagle	normal exposure 1965	carcass (median value) 0.09 ppm liver 0.09 " brain " threshold
50	HEPTACHLOR-EPOXIDE	man	from normal exposure to pesticides during life (range 28 weeks gestation to 88 years of age)	44 autopsies provided following mean values:
				perirenal fat 0.0220 ppm of whole tissue
				mesenteric fat 0.0320 " " "
				panniculus fat 0.0270 " " "
				bone marrow 0.0040 " " "
				TBLN* 0.0001 " " "
				adrenal 0.0012 " " "
				kidney 0.0009 " " "
				liver 0.0019 " " "
				brain 0.0002 " " "
				gonad 0.0001 " " "
				lung 0.0003 " " "
				spleen trace " " "

* tracheobronchial lymph nodes

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			ALKANES AND ALKENES	
	HEPTACHLOR-EPOXIDE (continued)	man	normal exposure to pesticides	storage
			US 1964	0.10 ppm in body fat
			1964	0.24 " " " "
			England 1963-64	< 0.1 " " " "
84			1964	< 0.01" " " "
			normal exposure to pesticides	storage
			general population, male US 1965	0.0008 ppm in whole blood
			general population, male US 1965	0.0011 " " plasma
			general population, female US 1965	0.0008 " " serum
334		bald eagle	normal exposure	(median value) 1965 1964 carcass 0.06 ppm 0.09 ppm liver threshold 0.15 ppm brain " 0.10 ppm
		golden eagle		carcass (median value) 1964-65 threshold liver " " brain " "
71	HEPTACHLOR and/or HEPTACHLOR EPOXIDE	fish from 50 nationwide sampling stations	normal exposure to pesticides	storage - found in 32% of (590) samples

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			ALKANES AND ALKENES	
125	LINDANE	fish	sublethal concentration followed by recovery period (up to 41 days)	storage visceral fat - concentration greatly exceeded those of any other tissue liver) gall bladder) pyloric caeca) intestine) high concentration muscle - low concentration
71		fish (50 nation-wide sampling stations	normal exposure	storage in 16% of 590 samples (≤ 0.1 ppm)
50	DDD	human	normal exposure to pesticides (28 weeks gestation to 88 yrs.)	44 autopsies (whole tissue basis) perirenal fat 0.0110 ppm mesenteric fat 0.0470 " panniculus fat 0.0180 " bone marrow 0.0760 " tracheobronchial lymph nodes 0.0100 " adrenal 0.0570 " kidney 0.0022 " liver 0.326 " brain 0.0020 " gonad 0.0015 " lung 0.0009 " spleen 0.0031 "

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect		
			AROMATIC DERIVATIVES			
	Halogenated	human	normal exposure to pesticides	44 autopsies (whole tissue basis)		
50	DDE		(28 weeks gestation to 88 yrs.)			
				perirenal fat		4.64 ppm
				mesenteric fat		4.40 "
				panniculus fat		4.48 "
				bone marrow		2.08 "
				tracheobronchial lymph nodes		1.38 "
				adrenal		0.875 "
				kidney		0.209 "
				liver		0.200 "
				brain		0.0831"
				gonad		0.0688"
				lung		0.0585"
				spleen		0.0305"
83			normal exposure to pesticides; ordinary dietary habits	fat	6.1 ppm (average)	no adverse effects
			appreciable environmental exposure to pesticides from drift from fields and orchards	fat	8.6 " "	"
			moderate occupational exposure	fat	19.0 ppm "	"
			extensive occupational exposure	fat	434 ppm "	"
334		bald eagles	normal exposure to pesticides		1965	1964
				carcass	8.90 ppm	7.80 ppm
				liver	4.91 "	5.15 "
				brain	1.37 "	1.00 "
		golden eagles	" " "	carcass	0.49 "	(1964-65)
				liver	0.33 "	"
				brain	0.10 "	"

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect	
			AROMATIC DERIVATIVES		
83	DDT	human	3.5 mg/man/day for 21 mos.	storage of increasing amounts of DDE, excretion of increasing amounts of DDA; steady state achieved and maintained until dosage stopped, excretion dropped off	
			35 mg/man/day for 21 mos.	same as for 3.5; excretion decreased very slowly after dosage stopped and higher than controls after 27 mos.	
84			0.041 mg/day meat abstainers 1958	2.3 ppm	
			0.164 mg/day - general population 1954	4.9 ppm	
			0.202 mg/day - prison volunteers 1956	7.4 ppm	
315			normal exposure pregnant women	fat 12.6 ppm, blood 0.0183 ppm	
			nonpregnant woman	fat 13.7 ppm	
			fetus	blood 0.0081 ppm	
63			normal exposure US 1961-62	6.7 ppm	
			France 1962-63	8.8 ppm	
			India 1964 (Delhi area, civilians)	27.2ppm	
			India (other cities - military)	11.8ppm	
50			normal exposure to pesticides (28 weeks gestation to 88 yrs.)	44 autopsies (whole tissue basis)	
				perirenal fat	1.33 ppm
				mesenteric fat	1.35 "
				panniculus fat	1.16 "
				bone marrow	0.411 "
				tracheobronchial lymph nodes	0.892 "
				adrenal	0.125 "

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect	
			AROMATIC DERIVATIVES		
	DDT (continued)	human	normal exposure to pesticides (28 weeks gestation to 88 yrs.)	kidney	0.0827 ppm
				liver	0.0467 "
				brain	0.0105 "
				gonad	0.0150 "
				lung	0.0147
				spleen	0.0112
73			normal exposure to pesticides during life	0-5 years (white) 0.49-25.7 ppm in body fay	
				6+ years (white) 1.9-21.1 ppm in body fat	
				0-5 years (nonwhite) 0.81-25.4 ppm in body fat	
				6+ years (nonwhite) 7.9-32.8 ppm in body fat	
437			USA (1955)	19.9 ppm in body fat	
			(1954-56)	11.7 " " " "	
			(1961-62)	12.6 " " " "	
			(1963)	6.7 " " " "	
			(1963)	11.1 " " " "	
			meat abstainers 1955-56	5.9 " " " "	
			Eskimos 1960	3.0 " " " "	
			1964	10.3 " " " "	
			Canada 1959-60	4.9 " " " "	
			Germany 1958-59	2.3 " " " "	
			France 1961	5.2 " " " "	
			Hungary 1960	12.4 " " " "	
			England 1961-62	2.2 " " " "	
			1964	4.0 " " " "	
			India (I) 1964	26.0 " " " "	
			(II) 1964	31.0 " " " "	
			(III) 1964	12.8 " " " "	
			USA 1964-65	3.1-8.6 " " "	

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			AROMATIC DERIVATIVES	
	DDT (continued)	Human	Czechoslovakia 1963-64	9.2 ppm in body fat
			Israel 1963-64	19.2
			Group I (0-9 yrs.) 1965-66	10.2
			Group II (10-69yrs.) "	18.1
437			normal exposure to pesticides in Israel (range 0-89 yrs. of age)	storage: 0-9 years (in body fat) stillborns 1.0-49.1 ppm neonates I (1-7 days) 0.8-32.8 " " II 8-30 days)1.0-14.0 " infants (30 days to 2 years) 1.0-60.0 " children (3-9 yrs.)4.8-13.3 " total 0.8-60.0 "
				storage: 10-89 yrs. (in body fat) 10-19 years 5.9-18.3 ppm 20-29 " 6.5-33.0 " 30-39 " 6.4-23.3 " 40-49 " 3.7-35.5 " 60-69 " 2.0-52.3 " 70-79 " 1.9-31.9 " 80-89 " 9.2-41.5 " total 1.9-82.6 "
84			normal exposure to pesticides	storage (whole tissue basis) adrenal glands 0.7 ppm
				storage (in extractable lipid) 3.4 ppm " periadrenal fat 7.5 ppm in extractable lipid
				storage found in brain, kidney, liver, gonads
160			normal exposure through life	no correlation between concentration in fat and pathological abnormalities

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			AROMATIC DERIVATIVES	
151	DDT (continued)	human	exposure status general population in USA	
			< 1942	0 ppm in body fat
			1950	5.3 " " "
			1955	19.9" " "
			1954-56	11.7" " "
			1961-62	12.9" " "
			meat abstainers 1955-56	5.9 " " "
			Eskimos (Alaska) 1960	3.9 " " "
			residents near orchards 1954-56	15.6" " "
			agricultural applicators 1954-56	35.1" " "
			formulator 1951	263 " " "
			formulator 1954	1.131 " "
			Canada - general population	4.9 ppm " "
			Germany - general population	2.3 " " "
			England - general population	2.2 " " "
			France - general population	5.2 " " "
337			variable exposure	storage directly related to daily intake; correlation between concentration of DDT in blood and other tissues in 44 autopsies subjects with highest total residues in tissues showed emaciation, variety of cancers, extensive focal or generalized pathological conditions of the liver

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			AROMATIC DERIVATIVES	
	DDT (continued)	human		comparison of healthy controls and those dying of diseases of liver, CNS, and miscellaneous pathologies showed: 1. strong association of DDT residues with some CNS pathologies, carcinoma, portal cirrhosis and hypertension 2. equally strong association of these residues in sick with histories of domestic used of pesticides
84			normal exposure - general population, male, US 1965	0.0193 ppm in whole blood 0.0415 ppm in plasma
			general population, female, US, 1965	0.0260 ppm in serum
			general population, England, 1964	0.013 ppm in whole blood
337			0.0021-0.0034 mg/kg/day for 12 or 18 months	storage proportional to dosage
			0.038-0.063 mg/kg/day "	storage proportional to dosage
			0.36-0.61 mg/kg/day "	" " "
			same as above for 21.5 months	no effects storage proportional to dosage
405			lived in vicinity of aldrin and dieldrin manufacturing plant	white matter of brain 0.023 ppm grey matter of brain 0.020 ppm liver 0.11 ppm

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect
			AROMATIC DERIVATIVES	
72	DDT (continued)	men and pregnant and lactating woman (control: nonpregnant women)	normal exposure to pesticides in metropolitan area	concentration in plasma of pregnant and lactating women within same range as for nonpregnant small, significant decrease in concentrations of all DDT derived compounds, dieldrin, and total BHC at or soon after delivery; returned to levels of early pregnancy
83			normal exposure to pesticides, ordinary dietary habits	body fat 4.9 ppm
			appreciable environmental exposure to pesticides from drift from fields, orchards	body fat 6.0 ppm (difference small but significant) (no (adverse (effects
			moderate occupational exposure	fat 14.0 ppm
			extensive occupational exposure	body fat 648 ppm
189		fish		range: 0.021-16.20 ppm of whole fish average: 0.845 ppm
71			normal exposure	in all but 6 of 590 samples (≤ 45 ppm)
337		birds	found	influences physiology of egg; produces thinning of shell
63		ringneck pheasants	exposure in highly treated areas	average: 58 ppm upper limit: 2770 ppm
		penguins	exposure in untreated areas	≤ 0.18 ppm
		fish		≤ 0.44 ppm
		seals		≤ 0.12 ppm
		snails	20 ug/l	0.16 ppm
		bluegill sunfish	"	1.0 ppm
334		bald eagles	normal exposure	(median values) 1965 1964 carcass 0.20 ppm 0.42 ppm liver threshold 0.10 "

TABLE IV (CONT.) - CONCENTRATION AND EFFECTS OF ORGANIC POLLUTANTS IN HUMAN AND ANIMAL TISSUE

Ref	Agent	Species	Dose or Exposure	Effect		
			AROMATIC DERIVATIVES			
3[illegible]4	DDT (continued)	bald eagles	normal exposure	(median values)	1965	1964
				brain	threshold	threshold
		golden eagles	" "	carcass	1964-65	threshold
				liver		"
				brain		"

TABLE V - CARCINOGENICITY IN MAMMALS OF ORGANIC POLLUTANTS FOUND IN FRESH WATER EXAMINED BY THE ORAL ROUTE OF ADMINISTRATION

This table presents the available information on the carcinogenicity of chemicals which have been found in water and examined by the oral route of administration. Most of this information was obtained from books which summarized available data on carcinogenicity of chemicals in general. The majority of studies reported results on a few animals only and only a few studies attempted to show a dose response relationship. Dosage forms varied considerably and could not be computed to a common expression. The incidence of appearance of tumors were not always available and results were expressed only as positive. The results appear to be different depending upon the species of animals studied with mice having the highest proportion of positives. In some instances there was a high tumor formation in rats used as controls.

TABLE V - CARCINOGENICITY IN MAMMALS OF ORGANIC POLLUTANTS FOUND IN FRESH WATER EXAMINED BY THE ORAL ROUTE OF ADMINISTRATION

Ref	Agent	Species	Tumor	Dose
			ALKANES AND ALKENES	
	HALOGENATED			
74	ALDRIN	mouse	76/215	10 ppm in diet for 2 yrs.
384			+	15 ppm in diet for 330 days.
368		rat	0/120	25.0 ppm in diet for 2 yrs.
		dog	0/8	3 ppm in diet 6 d./wk for 15.6 mos.
64		rat	2/61*	2.5 ppm/2 yr in diet.
			3/66*	12.5 ppm in diet for 2 yrs.
			2/59*	25.0 ppm in diet for 2 yrs.
			9/91*	Control
368	BENZENE HEXACELORIDE	rat	0/12	100 ppm in diet up to 8 mos.
367	CHLORDANE	rat	0/40	150 ppm in diet for 104 wks.
		rabbit	0/9	400 mg/kg daily for 31 days.
74	DIELDRIN	mouse	77/218	100 ppm in diet for 2 yrs.
384			Positive	15 ppm in diet for 375 days.
64		rat	8/59*	2.5 ppm in diet for 2 yrs.
			10/70*	12.5 ppm in diet for 2 yrs.
			7/62*	25.0 ppm in diet for 2 yrs.
			9/91*	Control
368		rat	Negative	75.0 ppm in diet/6 mos.

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* Considered negative because of control data.

TABLE V (CONT.) - CARCINOGENICITY OF ORGANIC POLLUTANTS FOUND IN WATER

Ref	Agent	Species	Tumor	Dose
			ALKANES AND ALKENES	
167	ENDOSULFAN	mouse	Negative	2.15 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 6 ppm/d. in diet (0.5% gelatin) for 18 mos.
337	HEPTACHLOR	mouse	Postive	In diet/2 yrs.
337	HEPTACHLOR EPOXIDE	mouse	Positive	In diet/2 yrs.
367		rat	0/66	30 ppm in diet/12 wks.
368	LINDANE	rat	0/48	32 mg/kg in aqueous emuls. (gastric tube) daily for 6 mos.
			ALCOHOLS	
368	GLUCOSE	rat	0/13	1 ml soln in water, 20%, in dose of 0.8 ml every other day/1 yr.
			AMINES	
	AROMATIC			
367	ANILINE	rat	4/12	1.10% in synthetic basic diet, 10-65 mg/d./ body weight.
			2/10	0.1% in diet/312 days.
368	BENZIDINE	rat	2/10	0.017% in diet for 224 days.
			3/10	0.017% in diet for 424 days.
		dog	0/2	0.50-0.1 g once a wk for 20-128 days.

TABLE V (CONT.) - CARCINOGENICITY OF ORGANIC POLLUTANTS FOUND IN WATER

Ref	Agent	Species	Tumor	Dose
			AMINES	
367	BENZIDINE (continued)	rabbit	0/9	0.50-0.1 g once a wk for 20-128 days.
		dog	1/7	200 mg in capsule daily (6/wk) for 15 mos. followed by 300 mg in capsule daily (6/wk) for 45 mos (total 325 gm).
148	α-NAPHTHYLAMINE	rat	1/10	0.06% in food for 288 days.
368	β-NAPHTHYLAMINE	dog	9/9	300 mg capsule in diet daily for 24-35 mos.
			10/10	600 mg capsule daily. Dose varied up to 17 mos.
			2/4	200 mg in gelatin capsule 6 d./wk (increased after 6 mos to 600 mg: max cumulative dose 310 gm/animals) for 3 yrs.
			1/3	500 mg daily/18 mos.
			2/7	500 mg daily/26 mos.
			3/3	500 mg daily/35 mos.
			3/5	500 mg daily/34 mos.
			1/6	500 mg daily/34 mos.
			3/3	500 mg daily/31 mos.
			1/3	30 mg daily/ 24 mos.
			2/2	90 mg daily/29 mos.
			1/2	60 mg daily/ 29 mos.
			2/2	120 mg daily/ 22 mos.
			2/3	500 mg daily/29 mos.
			3/3	500 mg daily/30 mos.
			5/5	300 mg daily in food for 372 days.

TABLE V (CONT.) - CARCINOGENICITY OF ORGANIC POLLUTANTS FOUND IN WATER

Ref	Agent	Species	Tumor	Dose
			AMINES	
368	β-NAPHTHYLAMINE (continued)	rat	6/11	0.067% in diet/925 days.
		rabbit	2/29	0.1% soln. for 2 yrs. Avg. intake 350 mg/day.
68		dog	1/	25-50 mg/kg/d./24 mos.
		rhesus monkey	9/24	50-100 mg/kg/d./24 mos.
		mouse	Negative	200 mg/kg/d./24 mos.
	HETEROCYLIC			
367	PYRIDINE	rat	0/8	10% in diet/35 days.
			ORGANIC ACIDS	
	CARBOXYLIC			
367	ACETIC ACID	rabbit	0/5	0.1-0.7 gm/kg weight, dissolved in 50-100 ml drinking water, twice daily for 13 mos.
367	η-BUTYRIC ACID	rat	+/4	25% in synthetic diet for 3-35 wks.
368	2,4-D	rat	0/5	1 ml of 2% soln in water in diet/daily/6 mos.
367		dog	0/11	2, 5, 10 or 20 mg/kg in capsules, 5 d./wk/ 13 wks.
167		mouse	Negative	100 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 323 ppm/d. in diet (0.5% gelatin) for 18 mos.
367	2,4,5-T	dog	0/11	20 mg/kg in capsules, 5 d./wk/113 wks.
167		mouse	Negative	21.5 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 60 ppm/d. in diet (0.5% gelatin) for 18 mos.

TABLE V (CONT.) - CARCINOGENICITY OF ORGANIC POLLUTANTS FOUND IN WATER

Ref	Agent	Species	Tumor	Dose
			ORGANIC ACIDS	
	SULFONICS			
188	ABS	mouse	Negative	
		rabbit	Negative	
368	1,2-BENZANTHRACENE	mouse	Positive	0.5 mg in 0.1 ml heavy mineral oil 8 times at 3-7 d. intervals.
			Positive	0.5 mg in 0.1 ml heavy mineral oil 16 times at 3-7 d. intervals.
368	1,12-BENZOPERYLENE	mouse	Negative	
	3,4-BENZPYRENE	mouse	+/55	0.3 ml of 0.5% PB in PEG*solvent, once (30 weekly doses .3 ml of 3% croton oil in PEG after treatment).
368			+/30	30 wkly adm. of 0.3 ml of 0.5% carcinogen in polyethylene glycol-400.
			+/20	1 dose of 0.3 ml of 0.5% carcinogen in PEG-400.
			+/24	0.3 ml of 0.5% in PEG solvent once (30 wkly doses .3 ml of PEG after treatment).
			17/20	0.3 ml of 0.5% in PEG solvent.
			10/30	0.3 ml of 0.5% in PEG/3 times at 24 hr interval/30 wks.
			+/20	12.5 μgm in 0.25 ml PEG once.
			+/20	50 μgm in 0.25 ml PEG once.
			+/20	200 μgm in 0.25 ml PEG once.
			+/20	12.5 μgm in 0.25 ml PEG once.

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* PEG - polyethylene glycol

TABLE V (CONT.) - CARCINOGENICITY OF ORGANIC POLLUTANTS FOUND IN WATER

Ref	Agent	Species	Tumor	Dose
			ORGANIC ACIDS	
148	CHRYSENE	rat	Negative	0.3% in diet/30 days.
148	1,2,5,6-DIBENZANTHRACENE	mouse	3/10 2/10	10 mg (total dose) in diet/7 mos. 19 mg (total dose) in diet/5 mos.
148	PENTACHLOROPHENOL	rat	0/20	3.9 or 5 mg in food daily/26-28 wks.
		cat	0/4	1.25 or 2.8 mg/kg in diet/10 wks.
148	PENTACHLOROPHENATE, Na	rabbit	0/5	35-600 mg/kg in water for 34 days.
			AROMATIC DERIVATIVES	
	HALOGENATED			
368	DDD	mouse	Negative	0.1% in diet up to 6 wks.
167			*Potential	100 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 300 ppm/d. in diet (0.5% gelatin) for 18 mos.
402	DDT	mouse	196/683	Five generations of mice fed DDT at 2.8-3.0 ppm of the diet for 6 mos.
167			Positive	46.4 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 140 ppm/d. in diet (0.5% gelatin) for 18 mos.
100		rat	Positive	200-800 ppm in diet for near-life span.
		fish, trout	Positive	75 ppm.
107		rat	15/75	100, 200, 400 and 800 ppm in diet for 18 mos.

* Requires additional evaluation.

TABLE V (CONT.) - CARCINOGENICITY OF ORGANIC POLLUTANTS FOUND IN WATER

Ref	Agent	Species	Tumor	Dose
			MERCAPTANS AND OTHER SULFUR ORGANICS	
167	TEDION (TETRAFIDON)	mouse	Negative	100 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 260 ppm/d. in diet (0.5% gelatin) for 18 mos.

TABLE Va - CARCINOGENICITY IN MAMMALS OF POTENTIAL ORGANIC POLLUTANTS FOUND IN FRESH WATER IN HUMANS, ANIMALS, AND PLANTS

This table presents available information on the carcinogenicity of chemicals found in water which were not examined by the oral route of administration.

TABLE Va - CARCINOGENICITY IN MAMMALS OF ORGANIC POLLUTANTS FOUND IN FRESH WATER EXAMINED BY ROUTES OF ADMINISTRATION OTHER THAN ORAL

Ref	Agent	Species	Tumor	Dose
			AMINES	
	ALIPHATIC			
367	ETHYLAMINE	rabbit	0/6	50 and 100 ppm 7 hrs./day, 5 day/week, for 6 weeks. (Inhalation)
			ORGANIC ACIDS	
148	FLUORANTHENE	mouse	0/10	0.3% in benzene twice weekly. (Skin)
368	PYRENE	mouse	+/150	3 drops 3% in acetone once weekly (followed by 1 drop 5% croton oil in mineral oil once weekly). (Skin)
			6/20	10 thrice weekly applications of 8.3% solution in acetone (total dose - 0.25 g). (Skin)
			PHENOLS and QUINONES	
148	ρ-CRESOL	mouse	Negative	3% in alcohol 3 times weekly. (Skin)
		rat	Negative	3% in alcohol 3 times weekly. (Skin)

TABLE VI - CARCINOGENICITY IN MAMMALS OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER EXAMINED BY THE ORAL ROUTE OF ADMINISTRATION

This table presents available information on carcinogenicity of chemicals which are considered to be potential pollutants of fresh water and any statements that could be made about this table are the same as those presented for Table V.

TABLE VI - CARCINOGENICITY IN MAMMALS OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER EXAMINED BY THE ORAL ROUTE OF ADMINISTRATION

Ref	Agent	Species	Tumor	Dose
			ALKANES AND ALKENES	
	HALOGENATED			
368*	CARBON TETRA-CHLORIDE	dog	0/8	0.125-0.5 ml/kg 3 x wk in a 1:1 soln and corn oil.
		mouse	+/37	0.2 ml of 2% olive oil soln. 2 x wk interval, 3% soln. given wkly for 17 wks.
			Positive	0.1 ml of 40% soln. in olive oil, 3 x wk for 45-66 doses/13 1/2 wks.
148	CHLOROFORM	mouse	7/20	8 x 10^{-4} and 4 x 10^{-4} ml dose in olive oil every 4 days, 30 times.
165			0/40	2% in diet/13 mos.
167	MIREX	mouse	Positive	10 mg/kg/d. for 7-28 days of age (P.O. stomach tube), then 26 ppm/d. (0.5% gelatin) in diet for 18 mos.
167	STROBANE	mouse	Positive	4.64 mg/kg/d. for 7-28 days of age (P.O. stomach tube), then 11 ppm/d. for 18 mos (in diet 0.5% gelatin).
367	TETRACHLORO-ETHYLENE	rat	0/18	0.33 mg/kg, 8 doses at 4 d. interval.
148	TETRACHLORO-ETHANE	dog	0/1	1 ml 150 times.

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* Additional data in 148 and 367.

TABLE VI (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			ALCOHOLS	
148	AMYL ALCOHOL	rat	Negative	In food.
368	t-BUTYL ALCOHOL	rat	0/4	10% in basal diet for 30 d., 20% for 30 more days.
368	DIETHYLENE GLYCOL	rat	0/24	1% and 2% in drinking water/13 1/2 wks.
368	ETHYL ALCOHOL	rat	0/10	40 ml at 40° added to 100 gm of diet at 15° as drinking water/152 days.
		rat	0/60	15% in drinking water/226 days.
148	ETHYLENE GLYCOL	rat	0/30	50% in water, 2 ml/kg body wt. every other day for 8-79 days.
148	ETHYLENE GLYCOL MONO-η-BUTYL ETHER	rat	0/40	0.03%, 0.125%, 0.5% or 2.0% incorporated in diet (total of 0.018 g/kg/d.) for 90 days.
148	ETHYLENE GLYCOL MONOETHYL ETHER	rat	0/20	1.45% in food/2 yrs.
368	PROPYL ALCOHOL	rat	0/4	10% in diet for 30 d.; 20% in diet for 30 more days.
			AMINES	
367	HEXAMETHYLENE-DIAMINE	guinea pig	0/6	0.02 g daily/98 days.
	QUATERNARY			
367	ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDE	rat	0/168	0.015-0.5% in diet/2 yrs.

TABLE VI (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			AMINES	
367	CETYL DIMETHYL ETHYL AMMONIUM BROMIDE	mouse	0/10	0.060 gm/kg daily, 6 d./wk/30 days.
	HETEROCYCLICS			
167	AMITROLE	mouse	Positive	1000 mg/kg/d. for 28 d. (P.O. stomach tube) then 2192 ppm (0.5% gelatin) in diet for 18 mos.
167	ATRAZINE	mouse	Negative	21.5 mg/kg/d. for 7-28 days of age (P.O. stomach tube) then 82 ppm/d. in diet (0.5% gelatin) for 18 mos.
167	SIMAZINE	mouse	Negative	215 mg/kg/d. for 7-28 days of age (P.O. stomach tube), then 603 ppm/d. in diet (0.5% gelatin) for 18 mos total.
			ORGANIC ACIDS	
	CARBOXYLIC			
148	CAPROIC ACID	rat	0/2	10% in food/110 days.
367	LACTIC ACID	rabbit	0/5	0.1-0.7 gm/kg dissolved in 50-100 ml water, twice daily for 16 mos (13 mos actual treatment).
368	TANNIC ACID	rabbit	0/4	1 g/kg body weight daily/40 days.

TABLE VI (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			ORGANIC ACIDS	
	SULFONICS			
367	DECYLBENZENE SULFONATE, Na	mouse	0/10	0-210 gm/kg daily, 6d./wk/30 days.
368	DODECYLBENZENE SULFONATE, Na	rat	0/20	2000 ppm in diet/104 wks.
367	ISOPROPYLNAPHTHALENE SULFONATE, Na	mouse	0/10	0.19 gm/kg daily, 6 d./wk/30 days.
			ESTERS	
167	ARAMITE	mouse	Positive	464 mg/kg/d. for 7-28 d. of age (P.O. stomach tube), then 1112 ppm/d. (0.5% gelatin) in diet for 18 mos.
100		rat	Positive	200-400 ppm.
		dog	Positive	500-1400 ppm.
390		dog	Positive	500-1429 ppm/d./3 1/2 yrs in diet.
301		rat	+/1500	200-400 ppm in diet for 2 yrs.
		mouse	+/1000	200-400 ppm in diet for 2 yrs.
		dog	+/36	500-1400 ppm in diet for 3.5 yrs.
318		rat	+/300	200-400 ppm in diet for 2 yrs.
367	DIBUTYLPHTHALATE	rat	0/40	0.01-1.25% in diet/1 yr.
148	ETHYL ACETATE	rat	Negative	In diet/≥300 days.

TABLE VI (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			ESTERS	
167	OVEX	mouse	Negative	464 mg/kg/d. for 7-28 days of age (P.O. stomach tube), then 1019 ppm/d. in diet (0.5% gelatin) for 18 mos.
167	n-PROPYL ISOME	mouse	Negative	2000 ug/kg/d. from 7-28 days of age (P.O. stomach tube), then 6000 ppm/d. in diet (0.5% gelatin) for 18 mos.
337	PYRETHRINS	rat	*Potential	
			AMINE DERIVATIVES	
	AMIDES			
148	CAPROLACTAM	rat	0/6	Avg. of 0.667 g/kg/d. in drinking water/70 days.
167	CAPTAN	mouse	Negative	215 mg/kg/d. for 7-28 days of age (P.O. stomach tube), then 560 ppm/d. in diet (0.5% gelatin) for 18 mos.
367	SULFAGUANIDINE	rat	0/24	1% in diet/70 d., 12 with Vitamin E rich diet.
368	SULFANILAMIDE	rat	0/12	Rat cube diet containing sulphanilamide at levels of 0.04%/450 days.
	CARBAMATES			
167	CARBARYL	mouse	Negative	4.64 mg/kg/d. for 7-28 days of age (P.O. stomach tube), then 14 ppm/d. in diet (0.5% gelatin) for 18 mos.
49		rat	Negative	0.04, .02, .01, and .005% in diet for 2 yrs.

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* Requires additional evaluation

TABLE VI (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			AMINE DERIVATIVES	
49	CARBARYL (continued)	dog	Negative	414, 95, and 24 ppm in diet for 1 yr.
222	CHLOROPROPHAM	rat	Negative	2.0% in diet for 2 yrs.
		dog	Negative	2.0% in diet for 1 yr.
167	IPC	mouse	Negative	215 mg/kg/d. for 7-28 days of age (P.O. stomach tube), then 560 ppm in diet (0.5% gelatin) for 18 mos.
164		rat	Negative	2% in diet for 18 mos.
		mouse	Negative	2% in diet for 18 mos.
167	ISOLAN	mouse	Negative	0.0215 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 0.0603 ppm/d. in distilled water for 18 mos.
167	ZECTRAN	mouse	*Potential	4.64 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 11 ppm/d. in diet (0.5% gelatin) for 18 mos.
	THIOCARBAMATES			
167	FERBAM	mouse	Negative	10 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 32 ppm/d. in diet (0.5% gelatin) for 18 mos.
159		rat	Negative	.0025, .025, and .25% in diet/2 yrs.
167	NABAM	mouse	Negative	21.5 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 73 ppm in distilled water for 18 mos.

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* Require additional evaluation.

TABLE VI (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			AMINE DERIVATIVES	
167	THIRAM	mouse	Negative	10 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 26 ppm/d. in diet (0.5% gelatin) for 18 mos.
100		rat	Positive	
167	ZIRAM	mouse	Negative	4.6 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 15 ppm/d. in diet (0.5% gelatin) for 18 mos.
159		rat	Negative	0.0025, .025, and .25% in diet/2 yrs.
167	ZINEB	mouse	*Potential	464 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 1298 ppm/d. in diet (0.5% gelatin) for 18 mos.
	UREAS			
167	DIURON	mouse	Negative	464 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 1000 ppm/d. in diet (0.5% gelatin) for 18 mos.
167	MONURON	mouse	*Potential	215 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 517 ppm/d. in diet (0.5% gelatin) for 18 mos.
			PHOSPHATE ESTERS	
367	MALATHION	rat	Negative	5000 ppm in diet as 65, 90, or 99% technical product for 2 yrs.

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*Requires additional evaluation.

TABLE VI (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			ALDEHYDES AND KETONES	
148	ACETALDEHYDE	rat	Negative	In diet/300 days.
148	METHYL ETHYL KETONE	rat	Negative	In food/300 days.
			ETHERS	
148	DIOXANE	rat	0/2	1% in water/110 days; 3% in water/48 days.
167	PIPERONYL BUTOXIDE	mouse	*0	100 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 300 ppm/d. in diet (0.5% gelatin) for 18 mos.
147	ROTENONE	rat	Negative	5-15 mg/kg body weight daily/37 days.
167		mouse	Negative	1 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 3 ppm/d. in diet (0.5% gelatin) for 18 mos.
			UNSUBSTITUTED AROMATICS	
368	NAPHTHALENE	rat	Negative	In oil (in synthetic diet) 6 times a week, 10-20 mg until dose of 10 g/rat in food.
			PHENOLS AND QUINONES	
367	2,4-DINOTROPHENOL	rat	Negative	0.01-0.10 in diet/179 days.
367	β-NAPHTHOL	rat	0/5	2% in diet/2 mos.

* Requires additional evaluation.

TABLE VI (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			AROMATIC DERIVATIVES	
	HALOGENATED			
368	ρ-DICHLOROBENZENE	rabbit	0/7	500 mg/kg fed 5 d./wk for a total of 263 doses.
100	METHOXYCHLOR	rat	Positive	2000 ppm for 18 mos.
158		rat	+/13	0.0025% in diet/18 mos.
			+/10	.02% in diet/18 mos.
			+/16	.16% in diet/18 mos.
167	PERTHANE	mouse	*Potential	215 mg/kg/d. from 7-28 days of age (P.O. stomach tube), then 815 ppm/d. in diet (0.5% gelatin) for 18 mos.
	ARYLALKANES			
368	TOLUENE	rat	Negative	118, 354, or 590 mg/kg/d. in 2-3 ml olive oil soln. emulsified and 5-10% aqueous soln. of acacia for 138 feedings.

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* Requires additional evaluation.

TABLE VIa - CARCINOGENICITY IN MAMMALS OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER EXAMINED ONLY BY ROUTES OF ADMINISTRATION OTHER THAN ORAL

This table presents available information on carcinogenicity of chemicals which are potential pollutants of fresh water and which were not examined by the oral route of administration.

TABLE VIa - CARCINOGENICITY IN MAMMALS OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER EXAMINED ONLY BY ROUTES OF ADMINISTRATION OTHER THAN ORAL

Ref	Agent	Species	Tumor	Dose
			ALKANES AND ALKENES	
	HALOGENATED			
148	DICHLOROMETHANE	animal[1]	Negative	34 mg (10,000 ppm) 5 x wk., 4 hr. exposure. (Inhalation)
148	ETHYLENE DIBROMIDE	rat	Negative	50 ppm air, up to 63 seven hr. exposures daily. (Inhalation)
368	TRICHLORETHYLENE	cat	Negative	20 ppm, 75 min. daily. (Inhalation)
			ALCOHOLS	
367	2-ETHYL HEXANEDIOL-1,3	animal[1]	Negative	Undiluted daily/90 d. (Skin)
367	STREPTOMYCIN	guinea pig	Negative	13.7-55.8 gm/kg body weight (total dose). (I.M.)*
			AMINES	
	ALIPHATIC			
367	DIETHYLAMINE	rabbit	Negative	50 and 100 ppm 7 hrs/d./wk./16 weeks. (Inhalation)
367	PHENYLHYDRAZINE	rabbit	0/2	40 mg (S.C.).*
	HETEROCYCLICS			
148	ACRIDINE	mouse	0/100	1% in "90% benzol"/9 mos. (Skin)
368	NICOTINE	rat	0/16	2.5 mg (as the bitartrate) for 10 doses, 4 mg every work day for 4 mos., then 2 mg every work day until 6-1/2 mos. (S.C.)

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* I.M. - Intramuscular
S.C. - subcutaneous

TABLE VIa (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			ORGANIC ACIDS	
	CARBOXYLIC			
148	BENZOIC ACID	rabbit	Negative	Daily/40 days. (S.C. or I.V.)*
148	PHTHALIC ACID	rabbit	Negative	Daily/40 days. (S.C. or I.V.)
148	TRICHLOROACETIC ACID	mouse	Negative	In acetone, weekly, 3 applications. (Skin)
			ALKEHYDES AND KETONES	
368	ACETONE	mouse	Negative	0.2 ml of 100% 3 x week/1 year. (Skin)
148	ACETOPHENONE	rabbit	Negative	Daily/40 days. (S.C. or I.V.)
368	ACROLEIN	mouse	2/15	10 weekly applications of 0.5% solution in acetone (total dose - 12.6 mg) (weekly application of croton oil in acetone begun 25 day post-treatment 2 of 0.08% solution and 16 of 0.17% solution, alternating with test substance at 3-4 day intervals). (Skin)
367	CYCLOHEXANONE	guinea pig	Negative	10 mg/20 days, 50 mg/40 days, and 100 mg/20-40 days. (S.C.)
368	FORMALDEHYDE	rat	4/10	1 cc of a 0.4% aqueous solution, weekly/15 mos. (S.C.)
			UNSUBSTITUTED AROMATICS	
368	BENZENE	mouse	+/21	Twice weekly. (Skin)
			+/36	25 μl 2 x wk/24 weeks. (Skin)
			+/40	Painted 2 x week/40 weeks. (Skin)
			Negative	Once a week/4 mos., thrice weekly thereafter for 108 applications in 12 mos. (total dose - 8.9 gm). (Skin)

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* I.V. intravenous

TABLE VIa (CONT.) - CARCINOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

Ref	Agent	Species	Tumor	Dose
			UNSUBSTITUTED AROMATICS	
368	PHENANTHRENE	mouse	+/100	3 drops 3% in acetone once weekly followed by 1 drop 5% croton oil in mineral oil once wkly.
			5/20	10 thrice weekly applications of 18.0% solution in acetone (total dose - 0.54 g). (Skin)
			PHENOLS AND QUINONES	
148	CATECHOL	rabbit	Negative	Daily for 40 days. (S.C. or I.V.)
367	GUAIACOL	rat	Negative	1-4% in olive oil, 26 inj. (S.C.)
148	α-NAPHTHOL	mouse	Negative	5% in lard (0.25 ml, repeated inj.). (S.C.)
148	PYROGALLOL	mouse, rabbit	Negative	5-20% in acetone weekly. (Skin)
			AROMATIC DERIVATIVES	
	NITRO COMPOUNDS			
148	XYLENE	mouse	Negative	Weekly application. (Skin)
			SULFUR ORGANICS	
367	MUSTARD GAS	mouse	Negative	250 μg/ml in acetone, 0.05 ml, 5 times weekly. (Skin)

TABLE VII - MUTAGENICITY AND TERATOGENICITY OF ORGANIC POLLUTANTS FOUND IN FRESH WATER IN HUMANS, ANIMALS, AND PLANTS

AND

TABLE VIII - MUTAGENICITY AND TERATOGENICITY OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER IN HUMANS, ANIMALS, AND PLANTS

These tables contain available information with more or less pertinence to mutagenicity and teratogenicity on chemicals found in water. In considering presumptive tests for mutagenicity, caution is necessary for interpreting the results. It can be seen from the tables that a variety of test systems have been employed and it should be remembered that most are of little reliability in terms of extrapolating to man. Further reservations with respect to pesticides are needed because no pesticides now in wide use have been demonstrated to be mutagenic and the overwhelming majority has not been adequately tested. The majority of data in this table relates to mutagenicity or chromosomal effects obtained on plants or fungi. The teratogenicity information showed positive results on 29 of 32 chemicals and one of these was obtained on humans (methyl mercuric chloride). The data on the chick needs to be qualified since it is considered by some to be an overly sensitive system.

TABLE VII - MUTAGENICITY AND TERATOGENICITY OF ORGANIC POLLUTANTS FOUND IN FRESH WATER IN HUMANS, ANIMALS AND PLANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			ALKANES AND ALKENES					
HALOGENATED								
DIELDRIN	Plant sprout	10% soln.	C-mitosis	337				
ENDRIN	Barley	1000 ppm for 12 hrs.	Point mutations	453				
LINDANE	Onion root tip		Chromosome breaks	337	Chick	5 mg/egg	Negative	244
		0.00125%	Aneuploidy and chromosome fragmentation	337				
	"	0.0006-2.0%	C-mitosis	337				
	Other plant root tip	solid particles	Chromosome aberrations	337				

TABLE VII (CONT.) - MUTAGENICITY AND TERATOGENICITY OF ORGANIC POLLUTANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			ORGANIC ACIDS					
CARBOXYLIC								
2,4-D	Narcissus root tip	0.01-0.1%	C-mitosis	337	Mouse	98 mg/kg	Eye anomalies	337
	Cotton		Effect on nucleic acid synthesis	25	Mouse	98-100 mg/kg	Negative	337
					Mouse	46-150 mg/kg S.C. day 6-14	Eye anomalies, agnathia	95
	Onion root tip	0.01-0.1%	C-mitosis chromosome aberrations	337				
	Vicia faba root tip	0.001-0.1%	Abnormal mitosis	337				
	Onion root tip	25-500 ppm	Chromosome aberrations	337				
	Tradescantia	0.001-0.1%	Abnormal mitosis	356				
2,4,5-T	Apricot	100 mg/l sprayed	Slight anti-mitotic effect	36	Mouse	113 mg/kg	Cleft palate Cystic kidney	337
					Mouse	150 mg/kg	Cleft palate	95
	Onion root tip	25-500 ppm	Chromosome aberrations	337	Chick		Cleft plate Beak deformities	76

TABLE VII (CONT.) - MUTAGENICITY AND TERATOGENICITY OF ORGANIC POLLUTANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
UNSUBSTITUTED AROMATICS								
BENZOPYRENE	Mouse	750 mg/kg I.P. single dose	Induction of dominant lethals	96				
1,2,5,6-DIBENZ-ANTHRACENE	Fungus		Positive	21				
PHENOLS AND QUINONES								
PENTACHLORO-PHENOL	Plant cells		Positive	11				
AROMATIC DERIVATIVES								
HALOGENATED								
DDD					Mouse	46.4 mg/kg	Negative	337
DDT	Mouse	105 mg/kg	Negative	96	Chick		Negative	244
	Plant	saturated solution	C- Mitosis Chromosome breaks	337				
MERCAPTANS AND OTHER SULFUR ORGANICS								
TEDION					Mouse	217 mg/kg	Negative	337

TABLE VII (CONT.) - MUTAGENICITY AND TERATOGENICITY OF ORGANIC POLLUTANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			ORGANOMETALICS					
METHYL MERCURY	Fruit fly	0.25 ppm in food	Offspring with extra chromosome	1	human	From fish	Congenital cases born	169

TABLE VIII - MUTAGENICITY AND TERATOGENICITY OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER IN HUMANS, ANIMALS AND PLANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			ALKANES AND ALKENES					
HALOGENATED								
CHLOROFORM	Onion		Positive	389				
ETHYLENE DIBROMIDE	Bull testis		Positive	12				
			AMINES					
HETEROCYCLIC								
ATRAZINE	Barley anther	1000 ppm for 12 hrs	On meiosis	453	Mouse		Negative	337
SIMAZINE	Barley anther	1000 ppm for 12 hrs	On meiosis	453				
			ORGANIC ACIDS					
CARBOXYLIC								
ENDOTHALL	Plant cell		Chromosome aberrations	337				
			ESTERS					
OVEX					Mouse		Negative	337

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			AMINE DERIVATIVES					
AMIDES								
CAPTAN	Human	0.010 mg/1 in culture	Inhibition of DNA synthesis	225	Mouse		Negative	337
	Mouse	9 & 500 mg/kg	Negative	96	Chick	18-20 ppm	Cleft palate Eye anomalies Bone anomalies	421
	Kangaroo rat	1.25 & 5.0 mg/1 in culture	Chromosome aberrations	225			Congenital malformations	244
					Rabbit		Negative	183, 187
					Rat	50-2000 mg/kg P.O.	Negative	183
					Hamster	125-1000 mg/kg P.O.	Negative	183
METEPA			Point mutations Chromosome alterations	337	Rat		Ectrodactyly Multiple malformations	187
	Mouse	40 mg/kg	Induction of dominant lethals	96				
TEPA			Point Mutations Chromosome alterations	337				
			Positive	51				

TABLE VIII (CONT.) - MUTAGENICITY AND TERATOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			AMINE DERIVATIVES					
TEPA (cont.)			Positive	52				
	Mouse	7 mg/kg I.P.	Induction of dominant lethals	96				
CARBAMATES								
CARBARYL	Barley anther	500 & 1000 ppm 12 hrs	Abnormal meiosis	453	Mouse	100 mg/kg	Hydrocephaly, skeletal	337
	Plant root tip	0.5 & 0.25 saturated	Chromosome aberrations	10	Guinea pig	300 mg/ kg P.O. during organogenesis	Bone defects Lack of kidneys and genital organs	339
						350 mg/kg	Congenital malformations	187
					Hamster	125 & 150 mg/kg P.O.	Negative	339
					Chick	1 mg/egg	Congenital malformations	244
						75 ppm/day	Congenital malformations	187
					Dog	6.25-50 mg/kg/day	Skeletal anomalies Failure in organ development	374

TABLE VIII (CONT.) - MUTAGENICITY AND TERATOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			AMINE DERIVATIVES					
CIPC	Plant cell	2.5,5,10,20, 40,80 ppm up to 8 hrs	C-Mitotic effect Nuclear disintegration	242				
IPC	Avena root and stem tip	0.1-o.5 ppm	Mitotic aberrations	337	Mouse	850 mg/kg	Eye anomalies	337
	Plant cells	2.5,5,10,20, 40,80 ppm up to 8 hrs	C-Mitotic effect Nuclear disintegration	242				
ZECTRAN					Mouse		Negative	337
THIOCARBAMATES								
FERBAM	Aspergillus niger spores	1000 ppm	Morphological mutants and reverse mutations	337	Mouse		Negative	337
	Onion root tip	240 ppm	Chromosome aberrations	337				
NABAM					Mouse		Negative	337
THIRAM					Mouse		Negative	337
						250 mg/kg P.O. during organogenesis	Bone & heart anomalies	339

TABLE VIII (CONT.) - MUTAGENICITY AND TERATOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			AMINE DERIVATIVES					
THIRAM (cont.)					Hamster		Congenital malformations	187
					Rat	100 ppm	Negative	187
UREAS								
DIURON					Mouse		Negative	337
MONURON	Barley anther	500 & 1000 ppm for 12 hrs	Abnormal meiosis	453	Mouse		Negative	337
			PHOSPHATE ESTERS					
ABATE					Lamb		Negative	299
BIDRIN					Chick		Bone anomalies Parrot beak	187
DEMETON					Chick		Congenital malformations	244
DIAZINON	Human lymphocytes	0.5 mg/1	Chromosome aberrations	411	Rabbit	7 or 30 mg/kg P.O.	Negative	339
					Hamster	0.125 or 0.25 mg/kg	Negative	339
					Chick		Congenital malformations	187

TABLE VIII (CONT.) - MUTAGENICITY AND TERATOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			PHOSPHATE ESTERS					
DICAPTHION	Onion root tip	0.5-6.0 sq. cm.	Chromosome breaks	337				
DICHLORVOS	Onion root tip	0.5-6.0 sq. cm.	Chromosome breaks	337				
EPN					Chick		Congenital malformations	187
GUTHION					Chick		Congenital malformations	187
IMIDAN					Rabbit		Negative	187
MALATHION					Chick	75 ppm/day	Congenital malformations	187
METHYL DEMETON					Chick		Congenital malformations	244
METHYL PARATHION					Mouse		Cleft palate	187
PARATHION	Onion root tip	0.01,0.005, 0.0075%	C-Mitosis	337	Chick	0.1 mg/egg	Congenital malformations	187
PHOSPHAMIDON	Barley anther	1000 & 500 ppm for 12 hrs	Slight effect on meiosis	453				
TRITHION					Mouse		Cleft palate	187

TABLE VIII (CONT.) - MUTAGENICITY AND TERATOGENICITY OF POTENTIAL ORGANIC POLLUTANTS

	MUTAGENICITY				TERATOGENICITY			
Agent	Species	Dose	Effect	Ref	Species	Dose	Effect	Ref
			ALDEHYDES AND KETONES					
FORMALDEHYDE	Mouse	20 mg/kg I.P.	Negative	96				
			PHENOLS AND QUINONES					
NAPHTHOL					Mouse	10 mg/kg	Eye anomalies	337
			ORGANOMETALS					
ETHYLMERCURY CHLORIDE	Triticum root tip	0.5-1.0%	Mitotic aberrations	337				

TABLE IX - SOURCES OF ORGANIC POLLUTANTS FOUND IN FRESH WATER

AND

TABLE X - SOURCES OF POTENTIAL ORGANIC POLLUTANS OF FRESH WATER

These tables contain chemicals which have been found in water (Table IX) and chemicals which could potentially be found in water (Table X) according to sources given in the literature. The sources are ranked in accordance with a number of chemicals originating from each source and are categorized into the three groups: industrial, agricultural and domestic. Industrial sources which did not specify the industry are listed separately. Taking the two tables together we find that chemical plants contribute the highest number of chemicals which either have been found or could potentially be found in fresh water. The agricultural source of pollution is one of pesticides and the domestic source of pollution consists of detergents. In terms of numbers of chemicals as well as classes of compounds, industrial sources contribute to fresh water pollution to a greater extent than agricultural or domestic sources.

TABLE IX - SOURCES OF ORGANIC POLLUTANTS FOUND IN FRESH WATER

INDUSTRIAL

Pesticide Formulating Plants:

- Aldrin
- Chlordane
- DDD
- DDE
- DDT
- Dieldrin
- Diethylamine
- Dimethylamine
- Endrin
- Ethylamine
- Heptachor
- Heptachloronorbornene
- Hexachloronorbornadiene
- Isodrin
- Methylamine

Chemical Plants:

- Acetic acid
- Aniline
- Butyric acid
- Def
- Formic acid
- Methane
- Propionic acid
- Pyrocatechol

Dye and Pigment Factories:

- Aniline
- Benzidine
- Formic acid
- Naphthylamine
- Phenol
- Propionic acid

Synthetic Rubber Plants:

- Diethylamine
- Dimethylamine
- Ethylamine
- Methylamine

Coal Tar Products Plants:

- Benzopyrene
- 3,4-Benzopyrene
- Cresol
- Pyrocatechol

Gas Plants:

- Aniline
- Benzopyrene
- Methane
- Pyridine

TABLE IX (CONT.) - SOURCES OF POLLUTANTS FOUND IN WATER

Coke Chemical Plants:

- Benzopyrene
- 3,4-Benzopyrene
- Pyridine

Petroleum Refineries:

- 3,4-Benzopyrene
- 1,2,5,6-Dibenzanthracene
- Methane

Shale Refineries:

- Benzopyrene
- 3,4-Benzopyrene
- Phenol

Cosmetic Plants (soaps and perfumes):

- Phenyl ether
- Propionic acid

Wood Distillation Plants:

- Acetic acid
- Pyrocatechol

Rubber Plants:

- Aniline
- Formic acid

Sugar Factory (beet):

- Acetic acid

Acetaldehyde Plant:

- Methylmercuric chloride

Varnish Manufacturing:

- Butyric acid

Textile Mills:

- Acetic acid

Winery:

- Acetic acid

TABLE IX (CONT.) - SOURCES OF POLLUTANTS FOUND IN WATER

Pyrolyzate Washing (effluent):

Pyrocatechol

Industrial (unspecified):

ABS
1,2-Benzanthracene
3,4-Benzfluoranthene
10,11-Benzfluoranthene
11,12-Benzfluoranthene
1,12-Benzperylene
3,4-Benzpyrene
Fluoranthene
Indeno (1,2,3-cd) pyrene
Methylmercuric chloride
Phenol
Pyrene

AGRICULTURAL

Aldrin
Benzene hexachloride
Chlordane
DDD
DDE
DDT
Dieldrin
2,4-D
2,6-Dichlorobenzonitrile
Endrin
Endosulfan
Fenac
Heptachlor
Heptachlor epoxide
Isodrin
Lindane
Ronnell
Silvex
Toxaphene

DOMESTIC

Detergents:

ABS
LAS

Waste Processing Plants:

ABS
Phenol

TABLE X - SOURCES OF POTENTIAL ORGANIC POLLUTANTS OF FRESH WATER

INDUSTRIAL

Chemical Plants:

Acetone
Amyl alcohol
Butyl alcohol
Carbon tetrachloride
Chloroform
Chloroaniline
Cyclohexane
Cyclohexene
Dibromo-heptafluoroisobutyl methyl ether
Diethylmercury
Diisopropylamine
Dimethylformamide
Dimethylphenylcarbinol
Dimethyl sulfide
Epichlorhydrin
Ethylene
Furfural
Maleic acid
Methyl alcohol
Methylethyl ketone
Methyl hexafluro-2-bromobutyrate
Methyltetrafluoropropionate
MGK 264
Monoethanolamine
Nitrobenzene
Octafluoroisobutyl methyl ether
Phenylhydrazine
Propylene
Propylisome
Saponin
Sesame Oil
Sulfoxide
Tetrachloroethylene
Tetrachloroheptane
Tetrachlorononane
Trichloroethylene
Xylene

Petroleum Plants:

Acetonitrile
Actusol
Adiponitrile
Benzonitrile
Butyl mercaptan
Chevron NI-O
Chloronitrosocyclohexane
Chlorophenol
Corexit 7664
Cyclohexane
Cyclohexanol
Cyclohexanone
Cyclohexene
E-314
F.O. 300B
Heptane
Holl-Chem 622
Jan-Solv-60
Lactonitrile
Oxydipropionitrile
Petrolite W-1439
Seasweep
Spill-X
Tetraethyl lead

TABLE X (CONT.) - SOURCES OF POTENTIAL ORGANIC POLLUTANTS OF WATER

Plastic Manufacturing:

- Butyl acetate
- Dichloromethane
- Diethylene glycol
- Ethylene
- Formaldehyde
- Furfural
- Hexachlorocyclopentadiene
- Hexachloroethane
- Perfluoroisobutenyl ethyl ether
- Phenylhydrazine
- Tetrachloroethane
- Trichlorobenzene

Tar and Gas Plants:

- Acridine
- Amyline
- Benzene
- Benzoic acid
- Guaiacol
- Naphthalene
- Quinaldine
- Quinoline
- Rosolic acid
- Thiophene
- Toluene

Rubber Plants:

- 1,4-Butanediol
- Butylene
- Carbon tetrachloride
- Dichlorobutane
- 1,2-Dichlorohexafluorocyclopentene-1
- Dichloromethane
- Isobutylene
- Isoprene
- Phenylhydrazine
- Triethanolamine

Dye and Tanning Plants:

- Dimethylresorcinols
- Formaldehyde
- α-Naphthol
- β-Naphthol
- Pyrogallol
- Quinone
- Ursol
- Xylene

Ore Processing Plants:

- Acetamide
- Butyl xanthogenate
- Cresyl dithiophosphate
- Diisopropyl dithiophosphate
- Octylphenol EO
- Oleoylmethyl tauride
- Pine Oil
- Terpineol

Textile Plants:

- Benzene
- Chlorenanthic acid
- Chloropelargonic acid
- Chloroundecanoic acid
- Naphthalene

TABLE X (CONT.) - SOURCES OF POTENTIAL ORGANIC POLLUTANTS OF WATER

Photographic Wastes:

- Butyl acetate
- Hydroquinone
- Pyrogallol
- Quinone

Nylon Manufacturing:

- Adiponitrile
- Hexamethylenediamine
- Hexamethylenediamine adipate

Pulp Mill:

- Methyl mercaptan
- 4-(ρ-Tolyl)-1-pentanol
- Tetrachlorocatechol

Organic Synthesis Plants:

- Formaldehyde
- Phenylhydrazine

Pharmaceutical Manufacturing:

- Monoethanolamine
- Streptomycin

General Industry (unspecified):

- Acetone
- Alkyldimethyl benzylammonium chloride
- Alkyldimethyl chlorobenzylammonium chloride
- 4-Amino-m-toluene-sulfonic acid
- Butyl xanthogenate
- 1,4-Butynediol
- Cetyldimethylethylammonium bromide
- Citric acid
- Cresyl dithiophosphate
- Diethylene glycol
- Dinitrotoluene
- Ethyl alcohol
- Ethylene
- Furan
- Isobutyl alcohol
- Lactic acid
- Methoxy polypropylene glycol
- Morpholine
- Phenylhydrazine
- Picoline
- Propyl alcohol
- Propylene
- Tetrahydrofurfuryl alcohol
- Vetluzhsk Oil

TABLE X (CONT.) - SOURCES OF POTENTIAL ORGANIC POLLUTANTS OF WATER

AGRICULTURAL

Abate
Acrolein
Acrylonitrile
Algibiol
Alkydimethyl benzylammonium chloride
Alkydimethyl chlorobenzyl ammonium chloride
Amitrole
Anisole
Apholate
Aramite
Atrazine
Azodrin
Baygon
Bayluscide
Benzethonium chloride
Bidrin
Binapacryl
Bromophos
Butane
Butoxy polypropene glycol
Butyl mesityl oxide oxalate
C 56
Captan
Carbaryl
Carbathion
Carbophenothion
Cetyldimethylethylammonium bromide
Chloroaniline
Chlorobenzilate
Chlorpropham
Chlorthion
Ciodrin
Coumaphos
Dalapon
Dasanit
Dazomet
2,4-DB
DCU
Delrad
Demeton
2,4-DEP
Diazinon
Dicapthon
Dichlone
Dichlorobenzene
Dichlorvos
Dicofol
Diethyl dithiophosphoric acid
Diethyl maleate
Diethyl toluamide
Dilan
Dimethrin
Dimethyl carbate
Dimetilan
Dinitrocresol
2,4-Dinitrophenol
Dinobuton
Dinoseb
Dioxathion
Diphacinone
Diquat
Disulfoton
Diuron
Drione
Endothall
EPN
Ethion
Ethyl hexanediol
Fenthion
Fenuron
Ferbam
Folex
Furfural
Gardona
Guthion
Hempa
Hercules 9699
Hexachlorobutadiene
Hexachloroethane
Imidan
IPC
Isolan
Isopropylamine
Kepone
Lethane 384
Malathion
Matacil
MCPB
Menazon
β-Mercaptodiethylamine
Mesurol
Metepa
Metham
Methoxychlor
S-Methyl-N-(methylcarbamoyloxy) thioacetamidate
Methyl parathion
Methyl trithion
Mevinphos
MGK Repellent 11

TABLE X (CONT.) - SOURCES OF POTENTIAL ORGANIC POLLUTANTS OF WATER

AGRICULTURAL
(continued)

MGK Repellent 326
Mirex
Mobam
Monuron
Nabam
Naled
α-Naphthol
β-Naphthol
Nemagon
Neotran
Nicotine
Ovex
Oxydemetonmethyl
Paraoxon
Paraquat
Perthane
Phorate
Phosphamidon

Phostex
Pinene
Piperonyl butoxide
Pival
Pyrethrins
Rotenone
Ruelene
Sarin
Schradan
SD 7438
SD 8530
Sesone
Shell D50
Simazine
Soricide tetraminol
Strobane
Strychnine
Sumithion

Tabutrex
2,3,5-TBA
2,3,6-TBA
Temik
Tepa
TEPP
Tetrachlorobenzene
Tetrachloroethane
Thionazin
Thiram
Tranid
Triaram
Trichlorfon
Trichloronate
Warfarin
Zectran
Zineb
Ziram

DOMESTIC

Alkyldimethyl benzylammonium chloride
Alkyldimethyl chlorobenzyl ammonium chloride
Blast
Butylbiphenyl sulfonate
Cetyldimethylethylammonium bromide
Decylbenzene sulfonate
3,9-Diethyl-tridecyl-6-sulfonate
Dodecylbenzene sulfonate

7-Ethyl-2-methyl-undecyl-4-sulfate
Ethyl phenylphenol sulfate
Fatty sorbitan
Isorpopylnaphthalene sulfonate
Lauric diethanolamide sulfonate
Lauryl alcohol EO
Lauryl alcohol sulfate EO
Lauryl glyceryl ether sulfonate
Lauryl imidazoline
Lauryl sulfate

Monoethanolamine
Nonyl Phenol EO
Oleyl alcohol EO
Phenylhydrazine
Polyethyleneglycolalkylphenol esters
Quaternary ammonium chloride
Quaternary pyridinium
Stearoyl EO
Sterinol
Sterox

TABLE XI - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

This table presents the reported maximum no-effect concentrations of organic chemicals when administered chronically to mammals or when tested for organoleptic effects in man. Except in a few instances, the sources for the information are from the Russian literature. Approximately 80% of the data is derived from organoleptic effects using human subjects.

TABLE XI - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

ALKANES AND ALKENES

Reference	Agent	mg/l	Location	Limiting Index
	Unsubstituted			
13	butylene	0.2	reservoir water	
354	cyclohexane	0.1	well water	sanitary-toxicological
355	cyclohexene	0.2	"	"
355	ethylene	0.2	"	"
13	isobutylene	0.5	reservoir water	
194,190, 228,191	isoprene	0.005	"	organoleptic
13	propylene	0.5	"	
	Halogenated			
429,430, 431	aldrin	0.002	reservoir water	sanitary-toxicological
214,438, 459		0.017*	surface water for public water supplies	
48		<1.0	reservoir water	organoleptic
357		0.00025*	finished water	
178,179	allyl chloride	0.31	reservoir water	organoleptic
274,275	butane, polychloro	0.01-0.02	"	"
219,252	carbon tetrachloride	0.3	"	sanitary-toxicological
228		5.0	"	organoleptic
438	chlordane	0.003	surface water for public water supplies	
357		0.00025	finished water	
228,185	chloroprene	0.1	reservoir water	organoleptic
300	chlorocyclohexane	0.05	"	sanitary-toxicological

* From American Maximum permissible concentration data.

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

ALKANES AND ALKENES

Reference	Agent	mg/l	Location	Limiting Index
	Halogenated			
132,228	dichlorobutane	0.05	reservoir water	organoleptic
184	dichlorobutene	0.05	"	"
206,207, 228,230	dichlorocyclohexane	0.02	"	"
380	1,2-dichlorohexafluoro-1-cyclohexene	0.4	"	sanitary-toxicological
381	1,2-dichlorohexafluorocyclopentene-1	0.4	"	"
414	dichloromethane	7.5	"	organoleptic
214,438	dieldrin	0.017*	surface water for public water supply	
214,438	endrin	0.001* 0.0001*	" finished water	
357	freon 253	0.1	reservoir water	sanitary-toxicological
214,438	heptachlor	0.018*	surface water for public water supply	
214,438	heptachlor epoxide	0.018*	"	
274,275	hexachlorobutadiene	0.01	reservoir water	organoleptic
284	hexachloropentadiene	0.001	"	"
415,438	hexachloroethane	0.01	"	"
214,438	lindane	0.056*	surface water for public water supplies	
357		0.005*	finished water	

* From American maximum permissible concentration data.

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

ALKANES AND ALKENES

Reference	Agent	mg/l	Location	Limiting Index
	Halogenated			
213	pinene, polychloro	0.2	reservoir water	sanitary-toxicological
415	tetrachloroethane	0.01	"	organoleptic
228		0.2	"	"
359	tetrachloroheptane	0.0025	"	"
359	tetrachlorononane	0.003	"	"
359	tetrachloropentane	0.005	"	"
359	tetrachloropropane	0.01	"	"
359	tetrachloroundecane	0.007	"	"
214,438	toxaphene	0.005*	surface water for public water supply	
357		0.0025*	finished water	
264,228	trichloroethylene	0.5	reservoir water	organoleptic
	Nitro Compounds			
206,207, 228,230	chloronitrosocyclohexane	0.005	reservoir water	organoleptic
352,228	nitrocyclohexane	0.1	"	"
393	nitromethane	0.005	"	based on possibility of forming chloropicrin

ALCOHOLS

Reference	Agent	mg/l	Location	Limiting Index
178,179	allyl alcohol	0.1	reservoir water	organoleptic
227,228, 286	butyl alcohol	1.0	"	"

* From American maximum permissible concentration data.

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

ALCOHOLS

Reference	Agent	mg/l	Location	Limiting Index
197	1,4-butanediol	5.0	reservoir water	sanitary-toxicological
197	1,4-butynediol	1.0	"	"
228,353	cyclohexanol	0.5	"	"
210	dichlorohydrin	1.0	"	organoleptic
313	diethylene glycol	1.0	"	sanitary-toxicological
376	dimethylphenyl-carbinol	0.05	"	"
313	ethylene glycol	1.0	"	"
466	ethylene glycol monoethyl ether	1.0	"	"
256,257	heptyl alcohol	0.005	"	"
227,228 286	isobutyl alcohol	1.0	"	dissolved O_2 and BOD
227,228	methyl alcohol		"	organic matter content, BOD, & dissolved O_2
210	monochlorohydrin	0.7	"	organoleptic
205,256	nonyl alcohol	0.01	"	sanitary-toxicological
233	pine oil	0.2	"	organoleptic
262	streptomycin	0.1	"	sanitary-toxicological
233	terpineol	0.05	"	organoleptic
321,322,	tetrahydro-furfuryl alcohol	1.0	"	sanitary-toxicological
320		0.5	--	

AMINES

Aliphatic

Reference	Agent	mg/l	Location	Limiting Index
462	diazobutylamine	0.07	reservoir water	sanitary-toxicological
85	diethylanolamine	1.0	"	BOD
86		0.8	"	organoleptic

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

AMINES

Reference	Agent	mg/l	Location	Limiting Index
176	diethylamine	2.0	reservoir water	sanitary-toxicological
122	diisopropylamine	0.5	"	"
88,89	dimethylamine	0.1	"	"
117	ethylamine	0.5	"	organoleptic
43	hexamethylene-diamine	0.01	"	sanitary-toxicological
44	hexamethylene-diamine adipate	1.0	"	"
93	hydrazine hydrate	0.01	"	"
116	isopropylamine	2.0	"	organoleptic
328	methylamine	1.0	"	sanitary-toxicological
114	β-mercaptodi-ethylamine	0.1	"	organoleptic
92,93	phenylhydrazine	0.01	"	sanitary-toxicological
85	triethanolamine	5.0	"	BOD
227,228, 461	ursol	0.1	"	organoleptic
	Aromatic			
217,455	aniline	0.1	reservoir water	sanitary toxicological
347	dichloroaniline	0.05	"	organoleptic
	Quarternary			
138	alkyldimethyl-benzylammonium chloride	0.5	drinking water	organoleptic
467	quarternary ammonium chloride	0.05	reservoir water	sanitary-toxicological

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

AMINES

Reference	Agent	mg/l	Location	Limiting Index
	Nitriles			
365	acetone cyanohydrin	0.001	reservoir water	sanitary toxicological
454	acrylonitrile	2.0	"	"
196	adiponitrile	0.1	"	"
	Heterocyclic			
249	cyanuric acid	6.0	reservoir water	organoleptic
214,438	2,5-lutidine	0.056	"	sanitary-toxicological
423	picoline	0.05	"	"
227,464	pyridine	0.2	"	"
	ORGANIC ACIDS			
	Carboxylic			
228	acetic acid	based on organic matter content, BOD, & dissolved O_2	reservoir water	general sanitary
195	acrylic acid	0.5	"	
228	benzoic acid	based on organic matter content, BOD, & dissolved O_2	"	general sanitary
228	butyric acid	"	"	"
214,438	2,4-D	0.1*	surface water for public water supply	
272		1.0	reservoir water	organoleptic
303		3.0	"	"
198,199	dalapon	2.0	"	"
129	2,4-DB	1.0	"	sanitary-toxicological

* From American maximum permissible concentration data.

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

ORGANIC ACIDS

Reference	Agent	mg/l	Location	Limiting Index
227,228	formic acid	based on organic matter content, BOD, & dissolved O_2	reservoir water	general sanitary
227,228	lactic acid	"	"	"
229	maleic acid	1.0	"	organoleptic
232	maleic anhydride	1.0	"	"
254,258	phthalic acid	0.5	"	sanitary-toxicological
214-438	2,4,5-T	0.1*	surface water for public water supply	
	Sulfonics			
168	alkyl benzene sulfonate	0.5	reservoir water	sanitary-toxicological
282	p-chlorobenzene sulfonate, Na	5.0	"	organoleptic
281,292	chlorophenyl chlorobenzene sulfonate	0.2	"	"
	ESTERS			
46	butyl acetate	0.3	reservoir water	organoleptic
346	diethyl maleate	1.0	"	conjunctival irritation tests
325	dimethyltere-phthalate	1.81	"	"
245	dioctylphthalate	2.0	"	"
27	methyl benzoate	0.001	inland waters	"
134,135	vinyl acetate	0.2-0.25	reservoir water	sanitary-toxicological-organoleptic

* From American maximum permissible concentration data

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

AMINE DERIVATIVES

Reference	Agent	mg/l	Location	Limiting Index
	Amides			
227,350	caprolactam	1-2	--	depends on watercourse
121	dicyanodiamide	10.0	reservoir water	organoleptic
456	dimethylformamide	10.0	"	sanitary-toxicological
392	methacrylamide	0.1	"	"
99	sulfadimesine	1.0	"	organoleptic
99	sulfaguanidine	0.01	"	sanitary-toxicological
99	sulfanilamide	0.5	"	organoleptic
94	sulfathiazole	0.1	"	sanitary-toxicological
	Carbamates			
123	carbaryl	0.1	reservoir water	organoleptic
5	chloropropham	1.0	"	"
5	IPC	0.2	"	"
	Thiocarbamates			
278	carbathion	0.0256	reservoir water	--
276		0.02	"	--
277		0.026	"	--
278	dimethyldithiocarbamate, NH_4	0.1	"	--
	Ureas			
13	urea	10.0	reservoir water	organoleptic

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

PHOSPHATE ESTERS

Reference	Agent	mg/1	Location	Limiting Index
202	acetophos	0.03	reservoir water	organoleptic
344	chlorophos	0.05	"	"
233,234	cresyl dithiophosphate	0.001	"	
223,227	demeton	0.01	"	organoleptic
218	diethylchlorothiophos	0.02	"	"
119	diethyldithiophosphoric acid	0.2	"	"
118	diisopropyl dithio phosphate, K	0.02	"	"
7	dimethoate	0.03	"	sanitary-toxicological
113	dimethyldithiophosphoric acid	0.01	"	organoleptic
112,227, 228	malathion	0.05	"	"
202	methylacetophos	0.03	"	"
6,101, 228	methyl-demeton	0.01	"	"
101	methyl parathion	0.02	"	"
227,239	parathion	0.003	"	sanitary-toxicological
469	tributylphosphate	0.01	"	organoleptic

ALDEHYDES AND KETONES

Reference	Agent	mg/1	Location	Limiting Index
15	acetaldehyde	0.2	reservoir water	organoleptic
227,228	acetone	based on content of organic matter, BOD, & dissolved O_2	"	general sanitary

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

ALDEHYDES AND KETONES

Reference	Agent	mg/l	Location	Limiting Index
377	acetophenone	0.1	reservoir water	sanitary-toxicological
136	acrolein	0.01	"	self-clarification processes
292	cyclohexanone	0.2	"	sanitary-toxicological
422		1.0	"	organoleptic
227,228, 287	formaldehyde	0.5	"	sanitary-toxicological
220	furfural	1.0	"	organoleptic
227,422	methylethylketone	1.0	"	"
	ETHERS			
283	anisole	0.05	reservoir water	organoleptic
245	dibutyl phthalate	2.0	"	sanitary-toxicological
14	diethyl ether	0.3	"	"
192,193, 252	dimethyldioxane	0.005	"	"
343	furan	0.2	"	"
37,364	perfluoroisobutenyl ethyl ether	0.3	"	"
	polyethyleneglycolalkylphenyl ethers			
132,228	OP-7	0.4	"	organoleptic
132,228	OP-10	1.5	"	"
216,227, 228	saponin	0.2	"	sanitary-toxicological
319,320	tetrahydrofuran	0.5	"	"

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

UNSUBSTITUTED AROMATICS

Reference	Agent	mg/1	Location	Limiting Index
307	benzene	0.25	reservoir water	sanitary-toxicological
227,228		0.5	"	"
455	naphthalene	0.05		
333	phenanthrene	0.4	reservoir water	organoleptic
333	pyrene	0.4	"	"

PHENOLS AND QUINONES

Reference	Agent	mg/1	Location	Limiting Index
410	o-aminophenol	0.01	reservoir water	sanitary-toxicological
410	p-aminophenol	0.05	"	"
45	benzoquinone dioxime	0.1	"	organoleptic
211,228	Cheremkhovsk tar	0.002	"	"
120	dichlorophenol	0.002	"	"
420	dimethyl-resorcinols	0.07	"	"
316,317	2,4-dinitrophenol	0.03	"	sanitary-toxicological
104	diphenylolpropane	0.01	"	organoleptic
271	hydroquinone	0.2-0.4	"	"
455	α-naphthol	1.0	"	
455	β-naphthol	0.5	"	
401	1.4-naphthoquinone	0.1	"	organoleptic
204	nitrotoluol	0.01-0.2	"	"
103,227	phenol	0.001	"	"
460,461	quinone	0.2	"	"
111,228	Vetluzhsk oil	0.02	"	"

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

AROMATIC DERIVATIVES

Reference	Agent	mg/l	Location	Limiting Index
	Halogenated			
186	m-chloroaniline	0.2	reservoir water	sanitary-toxicological
237,238		1.0	"	organoleptic
186,237	p-chloroaniline	0.2	"	sanitary-toxicological
418	chlorobenzene	0.02	"	"
214,438	DDT	0.042*	surface water for public water supply	
227,228		0.2	reservoir water	organoleptic-toxicological
357		0.5*	finished water	
347	dichloroaniline	0.05	reservoir water	organoleptic-toxicological
418	dichlorobenzene	0.002	"	organoleptic
143		0.03	"	"
143,228	hexachlorobenzene	0.05	"	sanitary-toxicological
214,438	methoxychlor	0.035*	surface water for public water supply	
101		0.05	reservoir water	sanitary-toxicological
98		20.0	streams	
75	nitrochlorobenzene	0.03	reservoir water	organoleptic
108	tetrachlorobenzene	0.02	"	sanitary-toxicological
143		0.03	"	organoleptic
143,227	trichlorobenzene	0.03	"	"
	Nitro compounds			
9	nitrobenzene	0.2	reservoir water	organoleptic
435	xylene	0.05	"	"

* From American maximum permissible concentration data.

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

AROMATIC DERIVATIVES

Reference	Agent	mg/1	Location	Limiting Index
	Aryl alkanes			
463	ethylbenzene	0.01	reservoir water	organoleptic
296	methylstyrene	0.1	"	"
375	propylbenzene	0.2	"	"
2	toluene	1.0	"	"
3,228		0.5	"	"
	MERCAPTANS AND OTHER SULFUR ORGANICS			
233,234	butyl xanthogenate	0.0001	reservoir water	organoleptic
227,228, 424	carbon disulfide	1.0	"	"
201	dimethyl sulfide	0.03	"	"
343	thiophene	2.0	"	"
	ORGANOMETALS			
458	diethylmercury	0.0001	reservoir water	sanitary-toxicological
458	ethylmercuric chloride	0.0001	"	"
227,228	tetraethyl lead	0.0	"	"
371	tetraethyl tin	0.0002	"	"
	POLYMERS			
308	butoxy propylene glycol	2.0	reservoir water	organoleptic
308	methoxy polypropylene glycol	0.5	"	sanitary-toxicological

TABLE XI (CONT.) - REPORTED MAXIMUM CONCENTRATION OF ORGANIC CHEMICALS FOUND IN FRESH WATER PRODUCING NO EFFECT IN MAMMALS WHEN ADMINISTERED ON A CHRONIC BASIS OR TESTED FOR ORGANOLEPTIC EFFECTS IN MAN

POLYMERS

Reference	Agent	mg/l	Location	Limiting Index
212	methyl-siliconate, Na	1.5	reservoir water	organoleptic
209	poly(ethylhydro-siloxane)	8.0	"	"
408	polymethacrylate	2.0	potable water	sanitary-toxicological
425	polystyrene, cationic	0.5	"	"

TABLE XII - ACUTE TOXICITY RANKING OF ORGANIC CHEMICALS FOUND IN FRESH WATER AS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

This table ranks acute toxicity of organic chemicals found in water based on LD_{50} data to show relative acute toxic effects. Chlorinated hydrocarbons show intense acute toxicity and all can be considered to be derivatives of norbornene. With the exception of methyl mercuric chloride they are the most toxic compounds now found in fresh water. Heptachlor and Chlordane also have the same chlorinated norbornene nucleus but are not as toxic. Apart from these compounds, the other most highly acute toxic compounds do not share common structural features but most of them contain chlorine atoms. (See pages 44 to 46 for a more detailed discussion of this table.)

TABLE XII - ACUTE TOXICITY RANKING OF ORGANIC CHEMICALS FOUND IN FRESH WATER AS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

0-99 mg/kg

1. Endrin
2. Methyl mercuric chloride
3. Isodrin
4. Aldrin
5. Endosulfan
6. Toxaphene

100-199 mg/kg

7. Lindane
8. Pentachlorophenol
9. Heptachlor
10. Sodium pentachlorophenate
11. Methyl mercuric chloride

200-299 mg/kg

12. DDT
13. Dimethylamine
14. 2,6-Dichlorobenzonitrile
15. Def
16. 2,4,5-T

300-399 mg/kg

17. 2,4-D
18. β-Isomer BHC
19. Chlordane
20. Benzene hexachloride
21. Ethylamine
22. DDD

400-499 mg/kg

23. o-Aniline
24. Aniline
25. Silvex

500-599 mg/kg

26. tp-ABS
27. Nitrochlorobenzene
28. Diethylamine

TABLE XII (CONT.) - ACUTE TOXICITY RANKING OF ORGANIC CHEMICALS FOUND IN FRESH WATER AS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

600-799 mg/kg

29. Ronnell
30. ABS Linear

800-999 mg/kg

31. DDE

1000-2499 mg/kg

32. ABS
33. o-Cresol
34. Fenac
35. p-Cresol

2500-5000 mg/kg

36. Acetic acid
37. Pyrocatechol
37. Formic acid

>5000 mg/kg

38. Butyric acid
39. Pyrene

TABLE XIII - ACUTE TOXICITY RANKING OF POTENTIAL ORGANIC POLLUTANTS OF WATER AS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

This table ranks the acute toxicity of organic compounds which are considered to be potential pollutants of fresh water. Of the most toxic compounds, 15 out of 23 are phosphate esters. The remaining 8 compounds are substituted pyridines (nicotine and picoline), carbamates (Isolan and Temik), an anticoagulant (diphacinone), acrolein, the organometallic tetraethyltin, and cyanohydrin. Among the remaining more toxic compounds (1 to 100 mg/kg), the organophosphorus compounds make up the largest grouping with 20 pesticides falling within this category.

TABLE XIII - ACUTE TOXICITY RANKING OF POTENTIAL ORGANIC POLLUTANTS AS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

0-49 mg/kg

1. Tepp
2. Temik
3. Phorate
4. Picoline
5. Dasanit
6. Diphacinone
7. Nicotine
8. Disulfoton
9. Demeton
10. Acetone cyanohydrin
11. Parathion
12. Paraoxon
13. Warfarin
14. Mevinphos
15. Thionazin
16. Schradan
17. Isolan
18. Carbophenothion
19. EPN
20. Guthion
21. Tetraethyl tin
22. Acrolein
23. 2,4-DEP
24. Phosphamidon
25. Methyl parathion
26. Chlorfenvinfos
27. Malaoxon
28. Coumaphos
29. Ethion
30. Dichlorvos
31. Bidrin
32. Azodrin
33. Tranid
34. Adiponitrile
35. Dioxathion
36. Mustard Gas
37. Dinitrocresol
38. Zectran
39. Pyrogallol
40. Dimetilan
41. Acetophos
42. Dimethoate
43. p-Dinitrobenzene
44. Matacil
45. Methylamine
46. 2,4-Dinitrophenol
47. Malathion
48. Trichloronate
49. Endothall
50. Tepa
51. Methylacetophos
52. Oxydemetonmethyl

TABLE XIII (CONT.) - ACUTE TOXICITY RANKING OF POTENTIAL ORGANIC POLLUTANTS AS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

50-99 mg/kg

53. Methyl demeton
54. Dinoseb
55. Diethyl mercury
56. Binapacryl
57. Cetyldimethyethylammonium bromide
58. Mesurol
59. Hercules 9699
60. Freon 253
61. Allyl Alcohol
62. Ciodrin
63. Streptomycin
64. Diazinon
65. Phenylhydrazine
66. Acrylonitrile
67. Dursban
68. Baygon
69. Hexachlorobutadiene
70. β-Naphthol
71. Paraquat
72. Lethane
73. Dichlorohydrin
74. Kepone
75. Apholate

100-199 mg/kg

75. 1,4-Butynediol
77. Ethylene dibromide
78. Imidan
79. Mobam
80. Carbaryl
81. Furfural
82. Quinone
83. Rotenone
84. α-Naphthol
85. Carbon Disulfide
86. Monochlorohydrin
87. Metepa
88. Epichlorhydrin
89. Perfluoroisobutenyl ethyl ether
90. Fenthion

200-299 mg/kg

91. HRS-1422
92. Pyrethrins
93. Quarternary pyridinium
94. Strobane
95. SD-8530
96. Ethyl mercuric chloride
97. Methyl perfluoromethylacrylate
98. Dimethylamine
99. Sterinol
100. Acrylic acid
101. Omite
102. Naled
103. Sumithion
104. m-Chloroaniline
105. Phostex
106. Carbathion
107. 1,2-Dichlorohexafluoro-cyclopentene-1
108. Pival
109. Dicapthon
110. Metham

TABLE XIII (CONT.) - ACUTE TOXICITY RANKING OF POTENTIAL ORGANIC POLLUTANTS AS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

300-399 mg/kg

111. p-Chloroaniline
112. Methyl hexafluoroisobutyrate
113. 2,3,5-TBA
114. Mirex
115. Methylomethacrylamide
116. Dazomet
117. Hydroquinone
118. Nitrophenol
119. Nitrotoluol
120. Alkydimethylbenzyl ammonium chloride
121. β-Mercaptodiethylamine
122. Thiram
123. Pinene, polychloro
124. Chloronitrosocyclohexane
125. 2-Ethylbutylamine

400-499 mg/kg

126. Ethylamine
127. Diquat
128. Trichlorfon
129. 3,9-Diethyltridecyl-6-sulfate
130. Tetrachloropentane
131. m-Nitroaniline
132. p-Nitroaniline
133. Triethylamine
134. Ruelene
135. Methacrylamide
136. Dilan
137. Tetrachloroheptane
138. Dichlorocyclohexane

500-599 mg/kg

139. Dichlorobenzene
140. Sulfoxide
141. Diethylamine
142. Dibutylamine
143. Diisopropylamine
144. Chlorthion
145. Dimethyldithiocarbamate

600-699 mg/kg

146. Hexachlorocyclopentadiene
147. Tetrachloropropane
148. Isopropylamine
149. DDA
150. Butyl xanthogenate
151. Vetuzhsk Oil
152. Sesone
153. 7-Ethyl-2-methylundecil-4 sulfate
154. Ethylene dichloride
155. 3,4-Dichloroaniline
156. MCPB

TABLE XIII (CONT.) - ACUTE TOXICITY RANKING OF POTENTIAL ORGANIC POLLUTANTS AS DETERMINED BY LD$_{50}$ IN MAMMALS USING ORAL ADMINISTRATION

700-799 mg/kg

157. Phenanthrene
158. Nitrobenzene
159. Dodecyldiphenyl ether sulfonate
160. Tetrachloroethane
161. Quaternary ammonium chloride
162. Dichloroethane

800-899 mg/kg

163. Formaldehyde
164. Delrad
165. Nitroethane

900-999 mg/kg

166. Nitromethane
167. Folex
168. Tetrachlorononane
169. Butane
170. Methylhexafluoro-2-bromobutyrate

1000-2499 mg/kg

171. Diethyldithiophosphoric acid
172. Dimethyl resorcinols
173. Lauryl sulfate
174. IPC
175. Zineb
176. Abate
177. Octafluoroisobutyl methyl ether
178. Menazon
179. Tetrachlorobenzene
180. Chlorobenzilate
181. Morpholine
182. Heptafluoroisobutylene methyl ether
183. Phthalic acid
184. Morestan
185. Amitrole
186. Gardona
187. Dimethyl carbate
188. Anisole
189. Dibromoheptafluoroisobutyl methyl ether
190. Ethylenediamine
191. Lauryl alcohol EO
192. Lauryl alcohol sulfate EO
193. Tributyl phosphate
194. Dibutyl phthalate
195. 1,4-Butanediol
196. Quinaldine
197. Cyclohexanol
198. o-Nitroaniline
199. Diethyl maleate
200. Cheremichousk Tar
201. Diethanolamine
202. Dichlone
203. Polystyrene, cationic
204. Chloropropham
205. 2,3,6-TBA
206. Monoethanolamine
207. 2-Ethylhexyl sulfate
208. Thanite
209. Bromophos
210. Nonyl phenol EO

TABLE XIII (CONT.) - ACUTE TOXICITY RANKING OF POTENTIAL ORGANIC POLLUTANTS AS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

1000-2499 mg/kg
continued

211. Vinyl acetate
212. Dimethylphenyl carbinol
213. Chloroform
214. Octylphenol EO
215. Chlorenanthic acid
216. Lauryl glyceryl ether sulfonate
217. Dioctyl succinate sulfonate
218. Isopropyl naphthalene sulfonate
219. Diethyltoluamide
220. Ethylphenylphenol sulfonate
221. Ovex
222. Sesame Oil
223. Alkyldimethylchlorobenzyl ammonium chloride
224. Decylbenzene sulfonate
225. Atrazine
226. Prometryne
227. Butylphenylphenol sulfonate
228. Naphthalene
229. Dodecylbenzene sulfonate
230. Aramite

2500-5000 mg/kg

231. MGK Repellent 11
232. 2,5-Dichloroaniline
233. Ethyl hexanediol
234. Hempa
235. Oleyl alcohol
236. Alkyl sulfonate
237. Lauric diethanolamide sulfonate
238. Butyl Alcohol
239. MGK 264
240. Chloropelargonic acid
241. Methyl benzoate
242. Hexachloroethane
243. Captan
244. Butyl acetate
245. Lauryl imidazoline
246. Dimethyl sulfide
247. Propyl alcohol
248. Butybiphenyl sulfonate
249. Diuron
250. Monuron
251. Methyl siliconate
252. Methyl ethyl ketone
253. Ferbam
254. Perthane
255. Dalapon
256. Oleoylmethyl tauride
257. Xylene
258. Cyclohexane
259. DCU
260. Propylisome
261. Methylstyrene
262. Simazine
263. Ethyl Acetate
264. Dimethrin
265. Methyl tetrafluoropropionate
266. Methoxychlor

TABLE XIII (CONT.) - ACUTE TOXICITY RANKING OF POTENTIAL ORGANIC POLLUTANTS DETERMINED BY LD_{50} IN MAMMALS USING ORAL ADMINISTRATION

>5000 mg/kg

267. Ethylene gylcol
268. MGK Repellent 326
269. Benzene
270. Dichloromethane
271. Carbon tetrachloride
272. Neotran
273. Trichloroethylene
274. Chloroundecanoic acid
275. Sulfanilamide
276. Piperonyl butoxide
277. Fenuron
278. Toluene
279. Butyl mesityl oxide
280. Tabutrex
281. Triethanolamine
282. Stearoyl EO
283. Urea
284. Dimethylsulfoxide
285. Butoxy polypropylene glycol
286. Fatty acyl sorbitan EO
287. Hexafluoropropylmethyl ether

TABLE XIV - RANKING OF REPORTED THRESHOLD DOSES OBTAINED BY CHRONIC ADMINISTRATION IN RATS

This table presents ranking of reported threshold doses which happen to have been obtained in rats as reported in the Russian literature. The small size of this table indicates that little has been published on chronic threshold doses of compounds which may appear in fresh water. There is a notable absence of pesticides except for carbathion and simazine which have a low ranking. Most of the other compounds in the table are common organics which share little in terms of structural similarity. A noteworthy feature is the presence of the three organometallic compounds: tetraethyltin, ethyl mercuric chloride and diethyl mercury at the top of the listing. The next compound listed has a 50-fold higher threshold dose in the listing of toxicity of these compounds. Alcohols, diols and chlorinated compounds are scattered throughout the list, as are aliphatic and aromatic amines. Threshold dose from chronic toxicity studies is an important means for arriving at quality criteria for chemicals in fresh water, the apparent incompleteness of this table indicates that efforts have not been particularly directed towards obtaining this information.

TABLE XIV - RANKING OF REPORTED THRESHOLD DOSES OBTAINED BY CHRONIC ADMINISTRATION IN RATS

	mg/kg	mg/1
Tetraethyl tin	0.00001	0.0002
Ethylmercuric chloride	0.00005	0.001
Diethyl mercury	0.00005	0.001
Dimethylphenylcarbinol	0.0025	0.05
Heptyl alcohol	0.0025	0.05
Nonyl alcohol	0.005	0.1
Cyclohexane	0.005	0.1
Epichlorhydrin	0.005	0.1
Tetrachlorobenzene	0.005	0.1
Dimethylamine	0.007	0.14
Diisopropylamine	0.025	0.5
Monoethanolamine	0.025	0.5
2,4-Dinitrophenol	0.031	0.6
Hexachlorobutadiene	0.04	0.8
Freon 253	0.05	1.0
Ursol	0.05	1.0
Chloronitrosocyclohexane	0.1	2.0
Methylamine	0.1	2.0
Furan	0.1	2.0
Saponin	0.1	2.0
Carbon tetrachloride	0.15	3.0
Perfluorobutenyl ethyl ether	0.15	3.0
1,4-Butynediol	0.2	4.0
Cyclohexanol	0.2	4.0
β-Naphthol	0.2	4.0
2,5-Dichloraniline	0.2	4.0
3,4-Dichloraniline	0.2	4.0
1,2-Dichlorohexafluorocyclopentene-1	0.25	5.0
Methoxypolypropylene	0.25	5.0
m-Chloroaniline	0.25	5.0
Isoprene	0.25	5.0
Diethylene glycol	0.5	10.0
Ethylene glycol	0.5	10.0
Carbathion	0.5	10.0

TABLE XIV (CONT.) - RANKING OF THRESHOLD DOSES

	mg/kg	mg/l
Pinene, polychloro	1.0	20.0
Dimethyldithiocarbamate	1.0	20.0
1,4-Butanediol	3.0	60.0
Isopropylamine	6.0	120.0
Vetluzhsk Oil	10.0	200.0
Simazine	20.0	400.0
2-Hydroxysimazine	50.0	1000.0
Dimethylformamide	50.0	1000.0

REFERENCES

1. Abelson, P.H. Methyl mercury. *Science, 169(3942):*1, 1970.

2. Abramovich, G.A., R.S. Belova, L.V. Galuzova, I.V. Pal'mova, and V.P. Rassolova. Biological basis for the maximum permissible concentration of toluene in water. *Tr. Sarativsk. Inst. Gig. i Profpatol. 5:*37-42, 1959.

3. Abramovich, G.A., R.S. Belova, L.V. Galuzova, E.V. Pal'mova, and V.P. Rassolova. Limit of allowable toluol concentration in water. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*52-57. Washington, D.C., U.S. Dept. of Commerce, 1962.

4. ABS (Alkylbenzenesulfonate) in drinking water in the United States. *J. Am. Water Works Assoc. 53:*297-300, 1961.

5. Aksenova, V.B. Comparative hygienic and sanitary-toxicological studies of herbicides (IPC and chloro-IPC) (isopropylphenylcarbamate and isopropyl N-(3-chlorophenyl)carbamate) in relation to their decomposition in reservoir waters. *Prom. Zagryazneniya Vodoemov. No. 9:*56-66, 1969.

6. Akulov, K.I. The maximum allowable concentration of methyl systox in reservoirs. *Sanit. Okhrana Voduemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*107-128, 1962.

7. Akulov, K.I. and V.T. Manzaev. Experimental basis for the determination of maximal allowable phosphamide concentration in water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *9:*56-65. Washington, D.C., U.S. Dept. of Commerce, 1966.

8. Akulov, K.I. and V.T. Mazeav. Experimental basis for permissible concentrations of the organophosphorus compounds, bimethyl dichlorovinyl phosphate and trichlorometaphos-3 in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 8:*21-32, 1967.

9. Alekseeva, N.P. Hygienic standardization of nitrobenzene in bodies of water. *Tr. Nauchn. Konf. Aspirantov i Ordinatorov*, pp.73-76, 1964.

10. Amer, S. Cytological effects of pesticides. I. mitotic effects of N-methyl-1-naphthyl carbamate "Sevin". *Cytologia (Tokyo) 30:*175-181, 1965.

11. Amer. S.M. and E.M. Ali. Cytological effects of pesticides. II. meiotic effects of some phenols. *Cytologia (Tokyo) 33:*21-33, 1968.

12. Amir, D. and R. Volcani. The effect of dietary ethylene dibromide on the testes of bulls. *Fertility and Sterility 18:*144-147, 1967.

13. Amirkhanova, G.F., Z.V. Latypova, and R.B. Tepeeva. Experimentally determined permissible concentration for ethylene propylene, butylene, and isobutylene in water bodies. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*28-40, 1965.

14. Amirkhanova, G.F. and Z.V. Latypova. Experimental basis for the maximum permissible concentration of diethyl ether in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*148-157, 1969.

15. Amirkhanova, G.F. and Z.V. Latypova. Experimental basis for the maximum permissible concentration of acetaldehyde in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*137-147, 1969.

16. Ancusa, M. and A. Roscovanu. Some aspects of the pollution of surface waters with phenols and oil residues. *Igiena 15(12):*741-746, 1966.

17. Anderson, R.B. and H.W. Everhart. Concentration of DDT in landlocked salmon (salmo salar) at Sebago Lake, Maine. *Trans. Am. Fisheries Soc. 95(2):*160-164, 1966.

18. Aubin, A.E. The effect of an acute DDT exposure on the spontaneous electrical activity of goldfish cerebellum. *Can. J. Zool. 47(2):* 163-166, 1969.

19. Avraman, F.V. Experimental substantiation of the maximum permissible concentration of prometryn in water reservoirs. *Gigiena i Sanit. 33(2):*12-16, 1968.

20. Banerju, S.K. (reviewer). Detergents. *J. Water Pollution Control Federation 462(6):*939-948, 1968.

21. Barratt, R.W. and E.L. Tatum. Carcinogenic mutagens. *Ann. N. Y. Acad. Sci. 71:*1072-1084, 1958.

22. Bartha, R. Pesticide interaction creates hybrid residue. *Science 166:*1299-1300, 1969.

23. Barthel, W.F., D.A. Parsons, I.I. McDowell, and R.H. Crissinger. Surface hydrology and pesticides. A preliminary report on the analysis of sediments of the lower Mississippi River. In: *Symposium on Pesticides and Their Effect on Soil and Water,* pp.128-144. Columbus, Ohio, 1965.

24. Barthel, W.F., J.C. Hawthorne, J.H. Ford, G.C. Bolton, L.L. McDowell, E.H. Grissinger, and D.A. Parsons. Pesticides in water: Pesticide residues in sediments of the lower Mississippi River and its tributaries. *Pesticides Monitoring J. 3(1):*8-67, 1969.

25. Basler, E. and K. Nakazawa. Effects of 2,4-D on nucleic acids of cotton cotyledon tissue. *Botan. Gaz. 122:*228, 1961.

26. Beilikhis, G.A., N.P. Labisova, and A.M. Parshina. Waste water containing tetraethyl lead. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *1:*191-197. Washington, D.C., U.S. Dept. of Commerce, 1962.

27. Bekker, A.K. Information for the establishment of hygienic norms for potassium benzoate and methyl benzoate in inland waters. *Biol. Abstr. 49:*11271, 1968.

28. Belyaeva, N.G. Hygienic standardization of mezidine as an industrial contaminant of bodies of water. *Gigiena i Sanit. 34(1):*11-17, 1969.

29. Benville, P.E., Jr., C.E. Smith, and W.E. Shanks. Toxic effects of dinethyl sulfoxide on salmon and trout. *Toxicol. Appl. Pharmacol. 12:* 156-178, 1968.

30. Bitman, J., H.C. Cecil, S.J. Harris and G.F. Fries. DDT induces a decrease in eggshell calcium. *Nature 224:*44-46, 1969.

31. Black, A.P. and R.F. Christman. Chemical characteristics of fulvic acids. *J. Am. Water Works Assoc. 55(7):*897-912, 1963.

32. Bliokh, S.S. The pollution of water by carcinogenic substances. *Gigiena i Sanit. 30(4-6):*100-104, 1965.

33. Bonser, G.M., D.B. Clayson, and J.W. Jull. Experimental induction of bladder tumors. *Brit. Med. Bull. 14(2):*146-152, 1958.

34. Borneff, J. and R. Fischer. Carcinogenic substances in water and soil. XII. Polycyclic, aromatic hydrocarbons in surface water. *Arch. Hyg. Bakteriol. 146:*572-585, 1963.

35. Borneff, J. and H. Kunte. Kanzerogene substanzen in wasser und boden. *Arch. Hyg. Bakteriol. 148:*226-243, 1965.

36. Bradley, M.B. and J.C. Crane. The effect of 2,4,5-trichloropehnoxyacetic acid on the cell and nuclear size and endopolyploidy in parachyma of apricots. *Am. J. Botany 42:*273-281, 1955.

37. Breidenbach, A.W., C.G. Gunnerson, F.K. Kawahara, J.J. Lichtenberg, and R.S. Green. Chlorinated hydrocarbon pesticides in major river basins, 1957-1965. *Public Health Rept. 82(2):*139-156, 1967.

38. Breidenbach, A.W. and J.J. Lichtenberg. DDT and dieldrin in rivers: A report of the national water quality network. *Science 141(9):*899-901, 1963.

39. Brenner, T.E. Biodegradable detergents and water pollution. In: *Advances in Environmental Science* (Editors: J.N. Pitts and R.L. Metcalf), pp.151-196. Wiley-Interscience, New York, 1969.

40. Bridges, W.R. Effects of time and temperature on the toxicity of heptachlor and kepone to redear sunfish. *Paper Presented at Biological Problems In Water Pollution, Third Seminar, Robert A. Taft Sanitary Engineering Center, Cincinnati.* Environmental Health Series, pp.247-249. U.S. Dept. of Health Education and Welfare publication, 1962.

41. Brook, E.S., N.V. Klimkina, and V.A. Savelova. Experimental basis for the determination of AG-salt concentration in water bodies. In: *U.S.S.R. Literature on Water Pollution Control* (Editor: B.S. Levine), *9:*37-45. Washington, D.C., U.S. Dept. of Commerce, 1966.

42. Brown, E. and Y.A. Nishioka. Pesticides in water. *Pesticides Monitoring J. 1(2):*38-46, 1967.

43. Bruk, E.S., N.V. Klimkina, and V.A. Savelova. Permissible concentration of hexamethylenediamine in water bodies. *Sanit. Okhrana. Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*69-83, 1965.

44. Bruk, E.S., N.V. Klimkina, and V.A. Savelove. Permissible concentration of hexamethylenediamine adipate in water bodies. *Sanit Okhrana Vodoemov ot Zagrazneniya Prom. Stochnymi Vodami No. 7:*56-68, 1965.

45. Budeev, I.A. Maximum permissible concentration of p-benzoquinone dioxime in reservoir water. *Gigiena i Sanit. 29(10):*15-20, 1964.

46. Bul'bin, L.A. Maximum permissible concentration of butyl acetate in water. *Gigiena i. Sanit. 33(4-6):*23-27, 1968.

47. Cabejazek, I., M. Rybak, and S. Szulinski. Effects in warmblooded animals of thiometon (2-ethylthioethyl o,o-dimethyl-thiophosphate) ingested in drinking water. *Roczn. Zak. Hig. 18(3):*257-265, 1967.

48. Cabejszek, I., M. Rybak, B. Styczynski, and J. Wojak. Permissible concentration of aldrin in water. *Roczniki Panstwowege Zakladu Hig. 15(5):* 503-512, 1964.

49. Carpenter, C.P., C.S. Weil, P.E. Palm, M.W. Woodside, J.H. Nair, III, and H.F. Smyth, Jr. Mamalian toxicity of 1-naphthyl-N-methylcarbamate (Sevin insecticide). *J. Agricultural and Food Chemistry 9(1):*30-39, 1961.

50. Casarett, L.J., G.C. Fryer, W.L. Yauger, and H.W. Klemmer. Organochlorine pesticide residues in human tissue--Hawaii. *Arch. Environ. Health 17(3):*306-311, 1968.

51. Chang, C.S. and A.B. Borkovec. Quantitative effects of TEPA, METEPA, and apholate on sterilization of male house flies. *J. Econ. Ent. 57:*480-490, 1964.

52. Chang, T.H. and W. Klassen. Comparative effects of tretamine, TEPA, apholate and their structural analogs on human chromosomes *in vitro*. *Chromosoma 24:*314-323, 1968.

53. Chapman, J.B. and P. Robson. Pentachlorophenol poisoning from bath water. *Lancet*, pp.1266-1267, 1965.

54. Chekal, V.N. Determination of the maximal permissible concentration of heptachlor in surface waters. *Gigiena i Sanit. 30(1-3):*334-338, 1965.

55. Cherkinskii, S.N. Principles for determination of maximal allowable concentrations. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine), *6:*131-144. Washington, D.C., U.S. Dept. of Commerce, 1964.

56. Cherkinskii, S.N., P.P. Dikun, and G.P. Yakoleva. Carcinogenic substances in the waste waters of industrial plants. *Gigiena i Sanit. 24(9):* 11-14, 1959.

57. Cherkinskii, S.N. and E.V. Faidysh. Comparative evaluation of the sensitivity of methods of finished and unfinished phagocytosis during the hygienic normalization of harmful substances in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*260-267, 1969.

58. Cherkinskii, S.N., E.V. Faidysh, and S.G. Davydova. Evaluation of the sensitivity of immunological tests for hygienic normalization of harmful substances in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 8:*295-300, 1967.

59. Cherkinskii, S.N., S.N. Krasovskii, and V.N. Tugarinova. Sanitary-toxicological research for hygienic normalization of harmful compounds in reservoir waters. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine), *8:*172-178. Washington, D.C., U.S. Dept. of Commerce, 1964.

60. Cherkinskii, S.N., V.E. Miklashevskii, and F.G. Murzakaev. Ability to form new temporary associations as a test of chronic sanitary-toxicological experiment. *Sanit Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 6:*323-340, 1964.

61. Cherkinskii, S.N., V.N. Tugarinova, and V.E. Miklashevskii. Functional tests in studies of sanitary-toxicological standardization. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine), *9:*190-196. Washington, D.C., U.S. Dept. of Commerce, 1966.

62. Chiu, Y.C., A. Hassan, F.E. Guthrie, and W.C. Dauterman. Studies on a series of branched-chain analogs of diethyl malathion and malaoxon with regard to toxicity and *in vitro* enzymatic reactions. *Toxicol. Appl. Pharmacol. 12:*219-228, 1968.

63. Cleaning our environment--the chemical basis for action. *Subcommittee on Environmental Inprovement, Committee on Chemistry and Public Affairs.* Washington, D.C., American Chemical Society, 1969.

64. Cleveland, F.P. A summary of work on aldrin and dieldrin toxicity at the Kettering Laboratory. *Arch. Environ. Health 13:*195-198, 1966.

65. Cohen, E.N., H.W. Brewer, J.W. Bellville, and R. Sher. The chemistry and toxicology of dichlorohexafluorobutene. *Anesthesiology 26:*140-153, 1965.

66. Cole, H., A. Bradford, D. Barry, P. Baumgarner, and D.E.H. Frear. Pesticides in hatchery trout--differences between species and residue levels occurring in commercial fish food. *Pesticides Monitoring J. 1(12):*35-37, 1967.

67. Colvin, H.J. and A.T. Phillips. Inhibition of electron transport enzymes and cholinesterases by endrin. *Bull. Environ. Contam. Toxicol. 3(2):*106-115, 1968.

68. Conzelman, G.M., Jr., et.al. Major urinary metabolites of 2-naphthylamine in dogs, monkeys, and mice. *Am. J. Vet. Res. 30(12):*2083-2090, 1969.

69. Cottam, C. Pesticides and water pollution. In: *Proceedings of the National Conference on Water Pollution,* pp.222-235. U.S. Dept. of Health Education and Welfare, Public Health Service, 1961.

70. Coulter, J.B. Water quality standards-salvation or curse. *Water Wastes Eng. 7:*12, 1970.

71. Croswell, H., W.L. Johnson, and A. Inglis. Organochlorine insecticide residues in fish (National Pesticide Monitoring Program). *Pesticides Monitoring J. 3(3):*145-171, 1969.

72. Curley, A. and R. Kimbrough. Chlorinated hydrocarbon insecticides in plasma and milk of pregnant and lactating women. *Arch. Environ. Health 18(2):*156-164, 1969.

73. Davies, J.E., W.F. Edmundson, N.J. Schneider, and J.C. Cassady. Pesticides in people--problems of prevalence of pesticide residues in humans. *Pesticides Monitoring J. 2(2):*805, 1968.

74. Davis, K.J. and O.G. Fitzhugh. Tumorigenic potential of aldrin and dieldrin in mice. *Toxicol. Appl. Pharmacol. 4:*187-189, 1962.

75. Davydova, S.G. Comparative hygienic and sanitation toxicological features of nitrochlorobenzene isomers for determination of their hygienic standard levels in water reservoirs. *Gigiena i Sanit. 32(8):*7-11, 1967.

76. Defoliants deformities: What risk? *Med. World News 15:*7, 1970.

77. Deichmann, W.B. and H.W. Gerarde. *Toxicology of Drugs and Chemicals.* Academic Press, New York and London, 1969.

78. Detergents as a health hazard. *Can. Med. Assoc. J. 90:*1089, 1964.

79. Dikun, P.P. and A.I. Makhinenko. Detection of 3,4-benzopyrene in the "Shist" plant resins, in its effluents and in water. *Gigiena i Sanit. 1:*10-12, 1963.

80. Dowden, B.F. and H.J. Bennett. Toxicity of selected chemicals to certain animals. *J. Water Pollution Control Federation 37(9):*1308-1316, 1965.

81. Drachev, S.M., A.A. Bylinkina, and V.F. Garshenina. The character and significance of surface-active agents in water. *Vysoke, Skoly. Chem-Technol. Praze. Technol. Vody 8(1):*161-166, 1965.

82. Drinking water standards, 1961. *J. Am. Water Works Assoc. 53(8):*935-945, 1961.

83. Durham, W.F. Pesticide exposure levels in man and animals. *Arch. Environ. Health 10:*842-846, 1965.

84. Durham, W.F. Body burden of pesticides in man. In: *Biological Effects of Pesticides in Mammalian Systems. Ann. N.Y. Acad. of Sci. 160:*183-195, 1969.

85. D'yachkov, V.I. Experimental data to substantiate the hygienic standard levels of diethanolamine and triethanolamine in water bodies. *Gigiena i Sanit. 29(11):*25-31, 1964.

86. D'yachkov, V.I. Comparative hygienic and sanitary-toxicological studies of di- and triethanolamines in relation to their normalization in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*105-118, 1960.

87. Dyatlovitskaya, F.G. Determination of pyridine bases in industrial sewage. In: *U.S.S.R. Literature on Water Supply and Water Pollution Control* (Editor: B.S. Levine), *2:*118-122. Washington, D.C., U.S. Dept. of Commerce, 1962.

88. Dzhanashvili, G.D. Hygienic substantiation of the maximum permissible content of dimethylamine in water reservoirs. *Gigiena i Sanit. 32(6):* 12-18, 1967.

89. Dzhanashvili, G.D. Maximum permissible concentration of dimethylamine in water bodies. *Gigiena i Sanit. 32(4-6):*329-335, 1967.

90. Ecological effects of pesticides assessed. *Environ. Currents 3(7):*619-621, 1969.

91. Edmundson, W.F., J.E. Davies, and W. Hull. Dieldrin storage levels in necropsy adipose tissue from a South Florida population. *Pesticides Monitoring J. 2(2):*86-92, 1968.

92. Ekshtat, B.Ya. Maximum permissible concentrations of hydrazine hydrate and phenylhydrazine in water bodies. *Gigiena i Sanit. 30(7-9):*191-197, 1965.

93. Ekshtat, B.Ya. Experimental basis for the maximum permissible concentrations of hydrazine hydrate and phenylhydrazine in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*186-200, 1969.

94. Elozarova, O.N., A.I. Kuper, L.V. Zhidkova, A.A. Khutoriansii, and K.O. Lastochkina. Experimental basis for the permissible concentration of norsulfazole in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 8:* 219-232, 1967.

95. Epstein, S.S. A family likeness. *Environment 12(6):*16-25, 1970.

96. Epstein, S.S. and H. Shafner. Chemical mutagens in the human environment. *Nature 219:*385-387, 1968.

97. Ershova, K.P. Carcinogenic pollution of water by effluents from petroleum refineries. *Gigiena i Sanit. 33(1-3):*268-270, 1968.

98. Ettinger, M.B. and D.I. Mount. A wild fish should be safe to eat. *Environ. Sci. Tech 3(12):*203-205, 1967.

99. Ezrokh, T.I. Experimental data for basing the maximum permissible concentration of sulfanilamide preparations in water basins. *Gigiena i Sanit. 31(3):*11-15, 1966.

100. Falk, H.L., S.J. Thompson, and P. Kotin. Carcinogenic potential of pesticides. *Arch. Environ. Health 10:*847-858, 1965.

101. Faust, S.D. Pollution of the water environment by organic pesticides. *Clin. Pharmacol. Therap. 5(6):*677-686, 1964.

102. Faust, S.D. and O.M. Aly. Water pollution by organic pesticides. *J. Am. Water Works Assoc. 56(3):*267-279, 1964.

103. Faust, S.D. and P.W. Anderson. Factors influencing the condensation of 4-aminoantipyrine with derivatives of hydroxybenzene. III. A study of phenol content in surface waters. *Water Res. 2(9):*515-525, 1968.

104. Fedyanina, V.N. Sanitary toxicological investigations of diphenylolpropane; standarization of its content in water. *Gigiena i Sanit. 33(7):*25-30, 1968.

105. Fedyanina, V.N. Sanitary toxicological investigations of epichlorhydrin as a basis for the establishment of its standard concentration in bodies of water. *Gigiena i Sanit. 33(1-3):*52-57, 1968.

106. Fischer, H.D. and H. Walther. Acute toxicity of some aliphatic fluorine compounds. *Toxicol. Appl. Pharmacol. 14(1):*114-117, 1969.

107. Fitzhugh, O.G. and A.A. Nelson. The chronic oral toxicity of DDT (2,2-bis(p-chlorophenyl-1.1.1-trichloroethane). *J. Pharmacol. Exp. Therap. 89:*18-30, 1947.

108. Fomenko, V.N. Determination of the maximal permissible concentration of tetrachlorobenzene in water basins. *Gigiena i Sanit. 30(1-3):*8-15, 1965.

109. vonFrank, A.J. Where are water quality standard heading? *Water Wastes Eng. 6:*16-18, 1969.

110. Frank, P.A., R.H. Hodgson, and R.D. Comes. Residues of two herbicides in water in irrigation canals. *Weeds 15(4):*353-355, 1967.

111. Fridlyand, S.A. and G.H. Krasovskii. Experimental determination of allowable Veluzhsk Oil concentration in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *5:*129-136. Washington, D.C., U.S. Dept. of Commerce, 1962.

112. Gabrilevskaya, L.N. Maximum allowable concentration of karbofos in reservoirs. *Sanit. Okhana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 4:*208-217, 1960.

113. Gabrilevskaya, L.N. and V.P. Laskina. The maximum allowable concentration of dimethyl dithiophosphoric acid in reservoir water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*187-200, 1962.

114. Gabrilevskaya, L.N. and V.P. Laskina. Maximal permissible β-Mercapto-diethylamine concentration in natural water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *8:*100-107. Washington, D.C., U.S. Dept. of Commerce, 1966.

115. Gabrilevskaya, L.N. and V.P. Laskina. Maximum permissible concentration of pentachlorophenol and sodium pentachlorophenolate in water reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:* 129-142, 1965.

116. Gabrilevskaya, L.N. and V.P. Laskina. Experimental basis for the permissible concentration of isopropylamine in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 8:*46-60, 1967.

117. Gabrilevskaya, L.N. and V.P. Laskina. Experimental determination of permissible concentration of monoethylamine in water bodies. *Sanit. Okhrana Vodeomov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*99-112, 1965.

118. Gabrilevskaya, L.N. and V.P. Laskina. The maximum allowable concentration of potassium diisopropyl dithiophosphate in the water of reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*219-232, 1962.

119. Gabrilevskaya, L.N. and V.P. Laskina. The maximum allowable concentration of diethyl dithiophosphorix acid and its potassium salt in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*201-218, 1962.

120. Gabrilevskaya, L.N. and V.P. Laskina. Experimental basis for the maximum permissible concentrations of di- and trichlorophenol in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*128-136, 1969.

121. Gabrilevskaya, L.N., V.P. Laskina, and E.V. Faidysh. Experimental basis for the maximum permissible concentration of dicyandiamide in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*96-104, 1969.

122. Gabrilevskaya, L.N., V.P. Laskina, and E.V. Faidysh. Experimental basis for permissible concentration of hydroquinone in bodies of water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*129-142, 1965.

123. Gabrilevskaya, L.N., V.P. Laskina, and E.V. Faidysh. Experimental basis for the permissible concentration of sevin in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 8:*33-45, 1967.

124. Gaines, T.B. Acute Toxicity of pesticides. *Toxicol. Appl. Pharmacol. 14(3):*515-555, 1969.

125. Gakstatter, J.H. The uptake from water by several species of fresh-water fish of p,p'-DDT, dieldrin and lindane; their tissue distribution and elimination rate. *Diss. Abstr. 27(11):*3820B, 1967.

126. Galuzova, L.V. Hygienic basis for determination of the limit allowable concentration of dinitrotoluol in water bodies. *Gigiena i Sanit. 28:* 35-40, 1963.

127. Garshenin, V.F. Admissible threshold concentrations of alkylbenzenesulfonate and alkanesulfonate in water bodies. *Maslob. Zhir. Prom. 29(10):* 20-23, 1963.

128. Gaufin, A.R., L. Jensen, and T. Nelson. Bioassays determine pesticide toxicity to aquatic invertebrates. *Water Sewage Works 108(9):*355-359, 1961.

129. Gavrilova, L.I. Experimental substantiation of the permissible concentration of 2,4-dichlorophenoxygamma-butyric (db) acid in water bodies. *Gigiena i Sanit. 29:*11-16, 1964.

130. Gebhardt, D.O.E. and M.J. vanLogten. The chick embryo test as used in the study of the toxicity of certain dithiocarbamates. *Toxicol. Appl. Pharmacol. 15(3):*316-324, 1969.

131. vanGendersen, H. and G.J. vanEsch. Toxicity of the herbicide dichlobenil (2,6-dichlorobenzonitrile) and its main metabolites. *Food Cosmet. Toxicol. 6:*261-269, 1968.

132. Goeva, O.E. Experimental determination of maximal allowable concentrations of surface active substances OP-7 and OP-10 in natural water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *5:*119-128. Washington, D.C., U.S. Dept. of Commerce, 1962.

133. Goeva, O.E. Maximum permissible concentration of vinyl acetate in water basins. *Gigiena i Sanit. 31(8):*209-214, 1969.

134. Goeva, O.E. Hygienic foundations for a norm for vinyl acetate concentrations in water basins. *Materialy Resp. Itog. Nauchn. Konf. p.o. Gig.:* 44-45, 1963.

135. Goeva, O.E. Data to substantiate the maximum permissible concentration of vinyl acetate in water bodies. *Gigiena i Sanit. 31(8):*19-24, 1966.

136. Goeva, O.E. Permissible concentration of acrolein in bodies of water. *Tr. Leningrad. Sanit. Gig. Med. Inst. 31(58):*63, 1965.

137. Gorecik, B. Phenols in tannery sewage. *Przegl. Skorzany 4:*86-90, 1964.

138. Goryainova, T.S. Harmful properties of synthetic surfactants. *Gigiena i Sanit. 33(1-3):*81-85, 1968.

139. Green, R.S., C.G. Gunnerson, and J.J. Lichtenberg. Pesticides in our national waters. In: *Agriculture and the Quality of Our Environment* (Editor: N.C. Brady) pp.137-156. AAAS Publ. 85, 1966.

140. Greichus, Y.A., A Greichus, and E.G. Reider. Residues in fish, wildlife, and estuaries. *Pesticide Monitoring J. 2(2):*90-92, 1968.

141. Gross, H. Increase in phenol concentration of the bank-filtered water of the Rhein at Ludwigshaven. *Gas-Wasserfach 104(30):*850, 1963.

142. Gruchow, N. Curbs of 2,4,5-T use imposed. *Science 168:*413, 1970.

143. Gurfein, L.N. and Z.K. Pavlova. Limits of allowable concentrations of chlorinated benzenes in water basins. In: *U.S.S.R. Literature on Water Pollution Control* (Editor: B.S. Levine) *3:*58-65. Washington, D.C., U.S. Dept. of Commerce, 1962.

144. Gurfein, L.M., Z.K. Pavlova, S.S. Iofan, and T.A. Bashmakova. The limit of allowable nitrochlorobenzene concentration in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*65-72. Washington, D.C., U.S. Dept. of Commerce, 1962.

145. Hansen, C.A. Standards for drinking water and direct reuse. *Water and Wastes Eng. 6:*44-45, 1969.

146. Harmeson, R.H. and T.E. Larson. Quality of surface water in Illinois. *U.S. Clearinghouse Fed. Sci. Tech. Inform. PB-185847,* 1969.

147. Hartung, H.O., H.A. Faber, H.E. Hudson, P.W. Kabler, W.W. Sanderson, D. Williams, and R.L. Woodward. Physiologic and health aspects of water quality. *J. Am. Water Works Assoc. 53:*1354-1360, 1961.

148. Hartwell, J.L. Survey of compounds which have been tested for carcinogenic activity. *Washington, D.C., U.S. Government Printing Office, PHS NO. 149,* 1951.

149. Hashimoto, Y. and J. Fukami. Toxicity of orally and topically applied pesticide ingredients to carp. *Bochu-Kagaku 34(2):*63-66, 1969.

150. Hassan, A. and W.C. Dauterman. Studies on the optically active isomers of 0,0-diethyl malathion and 0,0-diethyl maloxon. *Biochem. Pharmacol. 17:* 1431-1439, 1968.

151. Hayes, W. and W.E. Dale. Storage of insecticides in French people. *Nature 199:*1189-1191, 1963.

152. Heath, R.G., S.W. Spann, and J.F. Kreitzer. Marked DDE impairment of mallard repreduction in controlled studies. *Nature 224:*47-48, 1969.

153. Heinz, H.J. and W.K. Fischer. Detergent in water and sewage. *Fette, Seif Anstrichmittel 64:*270-279, 1962.

154. Henderson, C., Q.H. Pickering, and J.M. Cohen. The toxicity of synthetic detergents and soaps to fish. *Sewage and Ind. Wastes 31(3):*295-306, 1959.

155. Henderson, G.I. and D.E. Wooley. Studies on the relative insensitivity of the immature rat to the neurotoxic effects of 1,1-trichloro-2,2-bis (p-chlorophenyl)ethane (DDT). *J. Pharmacol. Exp. Therap. 170(1):*173-180, 1969.

156. Herman, S.G., R.L. Garrett, and R.L. Rudd. Pesticides and the western grebe. In: *Chemical Fallout* (Editors: M.W. Miller and G.G. Berg) pp.24-53. Charles C. Thomas, Springfield, Illinois, 1968.

157. Hobbie, J.E. Glucose and acetate in fresh water; concentrations and turnover rates. In: *Proceedings of IPB (Int. Biol. Programme) Symp. on Chemical Environment of the Aquatic Habitat* (Editor: H.L. Golterman) pp.245-251. Uitgevers Maatschappij, Amsterdam, 1966.

158. Hodge, H.C., E.A. Maynard, and H.J. Blanchet. Chronic oral toxicity tests of methoxychlor (2,2-di-(p-methoxyphenyl)-1,1,1-trichloroethane) in rats and dogs. *J. Pharmacol. Exp. Therap. 104:*60-66, 1952.

159. Hodge, H.C., E.A. Maynard, W.L. Downs, R.C. Coyle, Jr., and L.T. Steadman. Chronic oral toxicity of ferric dimethyldithiocarbamate (Ferbam) and zinc dimethyldithiocarbamate (Ziram). *J. Pharm. Exp. Therap. 118:*174-181, 1956.

160. Hoffman, W.S., H. Adler, W.I. Fishbein and F.C. Bauer. Relation of pesticide concentrations in fat to pathological changes in tissues. *Arch. Environ. Health 15(6):*758-765, 1967.

161. Hokanson, K.E.F. The effects of synthetic detergents on the early life history of the bluegill *Lepomis Macrochirus* (Rafinesque), in the upper Mississippi River. *Dissert. Abstracts 29B(3):*1212B, 1968.

162. Hopkins, O.C. Attitude of U.S. Public Health Service in development of drinking water standards, 1961. *J. Am. Water Works Assoc. 53:*946-950, 1961.

163. Hopkins, O.C. and O. Gullans. Water quality standards. *J. Am. Water Works Assoc. 52:*1159-1168, 1960.

164. Hueper, W.C. Carcinogenic studies on isopropyl-N-phenyl-carbamate. *Ind. Med. Surg. 21:*71-74, 1952.

165. Hueper, W.C. and W.W. Payne. Carcinogenic effects of adsorbates of raw and finished water supplies. *Am. J. Clin. Pathol. 39:*475-481, 1963.

166. Il'nitskii, A.P. and S.N. Varshavskaya. Water as a factor in spreading carcinogens in the environment. *Gigiena i Sanit. 29(9):*88-94, 1964.

167. Innes, J.R.M., B.M. Ulland, M.G. Valerio, L. Petrucelli, L. Fishbein, E.R. Hart, A.J. Pallotta, R.R. Bates, H.L. Falk, J.J. Gart, M. Klein, I. Mitchell, and J. Peters. Bioassay of pesticides and industrial chemicals for tumorigenicity in mice: A preliminary note. *J. Nat. Cancr. Inst. 42:*1101-1114, 1969.

168. *International Standards for Drinking Water, Second Edition.* World Health Organization, Geneva, 1963.

169. Irukayama, K. The pollution of Minamata Bay and Minamata disease. In: *Advances in Water Pollution Research*, J.P. Maroto and F. Josa (Co-Chairmen) pp.153-180. Washington, D.C., Water Pollution Control Federation, 1967.

170. James, G.V. *Water Treatment: A Guide to the Treatment of Water and Effluent Purification*, pp.177-194. The Technical Press, Ltd., London, 1965.

171. Johnson, C.C. USPHS potable water survey. *Water Wastes Eng. 7:*56, 1970.

172. Johnson, C.C. The PHS position on public water supply. *Water Wastes Eng. 6:*45-50, 1969.

173. Jones, K.H., D.M. Sanderson, and D.N. Noakes. Acute toxicity data for for pesticides. *World Reveiw of Pest Control 7(3):*135-143, 1968.

174. Jones, J.R.E. *Fish and River Pollution*, pp.118-153. Butterworths, London, 1964.

175. Kachatryan, M.K. Experimental determination of limit of allowable concentration of dichlorbutane in natural water basin. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *5:*22-30. Washington, D.C., U.S. Dept. of Commerce, 1962.

176. Kagan, G.Z. The determination of the maximum permissible concentrations of diethylamine and triethylamine in bodies of water. *Gigiena i Sanit. 30 (7-9):*351-356, 1965.

177. Kagan, G.Z. Use of an electroencephalographic method in a long-term sanitary toxicological experiment. *Prom. Zagryazneniya Vodoemov No. 9:* 233-245, 1969.

178. Karmazin, V.E. Effect of allyl alcohol and allyl chloride on the general sanitary system of reservoirs and on animals. *Vopp. Kommunal Gig. No. 6:* 108-111, 1966.

179. Karamazin, V.E. Establishing hygienic norms for allyl alcohol and allyl chloride in inland waters. *Biol. Abstr. 49:*11271-11272, 1968.

180. Kazakova, M.I., M.S. Chizhevskaya, and G.A. Kalashnikova. Contents of certain trace elements and toxic substances in the water of the Kana River in the region of Perm. *Tr. Perm. Med. Inst. 61:*210-216, 1965.

181. Kelus, J. Removal of phenol and cresol from water by permanganate. *Roczniki Panstwowege Zaklady Hig. 19(5):*525-530, 1968.

182. Kenaga, E. Tordon herbicides - evaluation of safety to fish and birds. *Down Earth 25(1):*5-9, 1969.

183. Kennedy, G., O.E. Fancher, and J.C. Calandra. An investigation of the teratogenic potential of captan, folpet, and difolatan. *Toxicol. Appl. Pharmacol. 13:*420-430, 1968.

184. Khachatryan, M.K. The maximum allowable concentration of dichlorobutene in reservoir waters. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*44-62, 1962.

185. Khachatryan, M.K. and T.A. Asmangulyan. Maximum allowable concentration of chloroprene in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 4:*169-176, 1960.

186. Khamuev, G.D. The maximum permissible concentration of p-chloroaniline and m-chloroaniline in water bodies. *Gigiena i Sanit. 32(1-3):*15-20, 1967.

187. Khera, K.S. and L.L. Whitta. Perinatal toxicity of pesticides. *Can. Med. Assoc. J. 100:*167-172, 1969.

188. Kitamoto, O., et.al. Diseases due to environmental disturbances chemicals. *Naika 21:*933-950, 1968.

189. Kleinert, S.J., P.E. Degurse, and T.L. Wirth. Occurrence and significance of DDT and dieldrin residues in Wisconsin fish. *Wis. Dep. Natur. Resour. Tech. Bull. 41:*1-44, 1968.

190. Klimkina, N.V. Hygienic standards for harmful waste products of the synthetic isoprene rubber industry contained in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *1:* 182-191. Washington, D.C., U.S. Dept. of Commerce, 1961.

191. Klimkina, N.V. Experimental determination of limit of allowable concentration of isoprene in natural basin water. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *5:*13-22. Washington, D.C., U.S. Dept. of Commerce, 1962.

192. Klimkina, N.V. Experimental determination of limit of allowable dimethyldioxane concentrations in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *5:*1-12. Washington, D.C., U.S. Dept. of Commerce, 1962.

193. Klimkina, N.V. The maximum allowable concentration of dimethyldioxane in reservoir water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*7-27, 1962.

194. Klimkina, N.V. The maximum allowable concentration of isoprene in reservoir water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:* 28-43, 1962.

195. Klimkina, N.V., Z.N. Boldina, and A.N. Sergeev. Experimental basis for the maximum permissible content of acrylic acid in reservoir waters. *Prom. Sagryazneniya Vodoemov No. 9:*137-147, 1969.

196. Klimkina, N.V. and E.S. Bruk. Experimental basis for the permissible concentration of adiponitrile in reservoir waters. *Prom. Zagryasneniya Vodoemov No. 8:*85-100, 1967.

197. Knyshova, S.P. Biological effect and the hygienic significance of 1,4-butynediol and 1,4-butanediol. *Gigiena i Sanit. 33(1):*37-41, 1968.

198. Kochkin, V.P. Experimental data for hygienic standardization of dalapon contents in water bodies. *Gigiena i Sanit. 32(2):*7-11, 1967.

199. Kochkin, V.P. The maximum permissible concentration of dalapon in water bodies. *Gigiena i Sanit. 32(1-3):*164-175, 1967.

200. Kokke, R. DDT: Its action and degredation in bacterial populations. *Nature 226:*977-978, 1970.

201. Koptyaev, V.G. Experimental determination of the maximum permissible concentration of dimethyl sulfide in water bodies. *Gigiena i Sanit. 32(1-3):* 15-20, 1967.

202. Korolev, A.A. Maximum permissible concentration of acetophos and methylacetophos in water bodies. *Gigiena i Sanit. 30(7):*9-14, 1965.

203. Kosachevskaya, P.I. Toxic properties of nitrotoluene as a factor of pollution of reservoirs with waste water. *Vrachebnoe Delo 2:*104-107, 1967.

204. Kosachevskaya, P.I. Hygienic norms of o-, m-, and p-nitrotoluol in reservoir waters. *Vrachebnoe Delo 3:*101-104, 1966.

205. Kostovetskii, Ya.I., K.F. Meleshchenko, I.M. Karandakova, and Z.I. Holdakova. Experimental data on the normalization of nonyl alcohol in reservoir waters. *Vop. Kommunal. Gig. 6:*66-70, 1966.

206. Kostovetskii, Ya.I., E.V. Lisovskaya, F.G. Dyatlovitskaya, and R.M. Surkina. The maximum allowable concentrations of chloronitrosocyclohexane and dichlorocyclohexane in reservoir waters. *Sanit. Okhrana Vodoemov ot Zagryazeniya Prom. Stochnymi Vodami No. 5:*94-106, 1962.

207. Kostovetskii, Ya.I. Experimental determination of limits of allowable concentrations of chloronitorsocyclohexane and dichlorocyclohexane in open basin water. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *5:*49-56. Washington, D.C., U.S. Dept. of Commerce, 1962.

208. Krasovskii, S.N. Recommended basic procedure for conducting acute experiments and methods for the evaluation of the results. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *9:* 166-171. Washington, D.C., U.S. Dept. of Commerce, 1966.

209. Krasovskii, G.N. and S.A. Fridlyand. Maximum permissible concentration of the GKZh-94 liquid in reservoir waters. *Gig. Otsenka Khim. Faktorov Vnesh Sredy* pp.10-12, 1966.

210. Krasovskii, G.N. and S.A. Fridlyand. Experimental basis for the permissible concentration of mono- and dichlorohydrin in reservoir waters. *Prom. Zagryaznentya Vodoemov No. 8:*129-139, 1967.

211. Krasovskii, G.N. and S.A. Fridlyand. Experimental determination of the maximal allowabel concentration of Cheremkhovsk Tar intermediate fraction in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *5:*137-145. Washington, D.C., U.S. Dept. of Commerce, 1962.

212. Krasovskii, G.N. and S.A. Fridlyand. The experimental basis for the maximum allowable concentration of sodium methysiliconate in inland waters. *Ref Zh Otd Vyp Farmakol Khimioter Sredstva Toksikol No. 11.54.976*, 1967.

213. Krasovskii, G.N. and S.P. Spasskii. Experimental determination of the limit of allowable polychloropinene concentration in natural water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *5:*88-97. Washington, D.C., U.S. Dept. of Commerce, 1962.

214. Krishnaswami, S.K. Suggested raw water quality goals. *Water Pollution and Control 107(3):*31-35, 1969.

215. Kudrin, L.V. Experimental basis for the determination of maximal permissible omega-chlorocarboxylic acids concentration in natural water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *8:*57-59. Washington, D.C., U.S. Dept. of Commerce, 1966.

216. Kraizman, P.S. Maximum allowable concentration of saponin in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 4:* 254-263, 1960.

217. Kuper, A.I. and V.F. Ozerova. Experimental basis for the permissible concentration of aniline in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 8:*156-169, 1967.

218. Kutakov, K.V. Comparative sanitary and toxicological characteristics of esters of thiophosphoric acid in connection with the sanitary control of water bodies. *Gigiena i Sanit. 33(12):*13-18, 1968.

219. Kutepov, E.N. Experimental data for the establishment of standards for carbon tetrachloride in bodies of water. *Gigiena i Sanit. 33(1-3):*35-41, 1968.

220. Kuznetsov, P.I. Hygienic substantiation of the maximum permissible concentration of furfural in reservoirs. *Gigiena i Sanit. 32(5):*7-11, 1967.

221. Kvitnitskaya, N.N., V.M. Orlovskii, and L.V. Grigor'eva. Hygienic evaluation of the ethyl acetate pollution of open reservoirs. *Vop. Kommunal Gig. 6:* 19-24, 1966.

222. Larson, P.S., E.M. Crawford, R.B. Smith, G.R. Hennegar, H.B. Haag, and J.K. Finnegan. Chronic toxicological studies on isopropyl-N-(3-chlorophenyl) carbamate (CICP). *Toxicol. Appl. Pharmacol. 2:*659-673, 1960.

223. Laskina, V.P. Limits of allowable mercaptophos concentration in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*126-134. Washington, D.C., U.S. Dept. of Commerce, 1962.

224. Lauer, G.J., H.P. Nicholson, W.S. Cox, and J.I. Teasley. Pesticide contamination of surface waters by sugar cane farming in Louisiana. *Trans. Am. Fisheries Soc. 95(3):*310-316, 1966.

225. Legator, M., F.J. Kelly, S. Green, and E.J. Oswald. Mutagenicity of Captan. *Ann. N. Y. Acad. Sci. 160:*344-351, 1969.

226. Lemke, R.E. and D.I. Mount. Some effects of alkylbenzene sulfonate of the bluegill, *Lepomis Macrochirus. Trans. Am. Fisheries Soc. 92(4):*372-378, 1963.

227. Levine, B.S. (Editor). Maximal permissible conentration of harmful substances in bodies of water used for general consumption. In: *U.S.S.R. Literature on Water Supply and Pollution Control 4:*18-20. Washington, D.C., U.S. Dept. of Commerce, 1962.

228. Limits of allowable concentrations of Harmful substances in natural water bodies used for sanitary-domestic purposes. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *8:*212-215. Washington, D.C., U.S. Dept. of Commerce, 1966.

229. Lisovskaya, E.V., F.G. Dyatlovitskaya, S.K. Potemkina, and L.A. Tomashevskaya. Experimental data for establishment of the permissible concentration of maleic acid in the water of water basins. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stocknymi Vodami.* pp.346-356, 1964.

230. Lisovskaya, E.V., Ya.I. Kostovetskii, and F.G. Dyatlovitskaya. Hygienic standardization of chloronitrosocyclohexane, dichlorocyclohexane simultaneously present in water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *8:*162-166. Washington, D.C., U.S. Dept. of Commerce, 1966.

231. Lisovskaya, E.V. Limit of allowable metaphos concentration in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*112-119. Washington, D.C., U.S. Dept. of Commerce, 1962.

232. Lisovskaya, E.V., F.G. Dyatlovskaya, and L.V. Tomashevskaya. Basic experimental data for the determination of maximal allowable maleic anhydride concentration in natural water reservoirs. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *7:*78-82. Washington, D.C., U.S. Dept. of Commerce, 1963.

233. Loshakov, Yu.T. Hygienic principles underlying the determination of allowable concentration limits of flotoreagents (butyl xanthogenate, cresyl dithiophosphate, pine oil and terpineol) in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *2:*160-167. Washington, D.C., U.S. Dept. of Commerce, 1962.

234. Loshakov, Yu.T. Permissible concentration for butyl xanthate and cresyl dithiophosphate in water bodies. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7*:166-177, 1966.

235. Love, R.W., L.A. Young, and H.O. Hartung. Water quality in the Missouri River progress and prospects. *J. Water Pollution Control Federation 39(12)*: 1986-2007, 1967.

236. Makhinya, A.P. Hygienic normalization of m-nitrophenol in reservoir waters. *Gig. Naselen. Mest.* pp.50-55, 1967.

237. Mal'kova, V.B. Experimental data to substantiate the maximum permissible concentration of m-chloroaniline in water bodies. *Gigiena i Sanit. 31(12)*: 6-10, 1966.

238. Mal'kova, V.B. Maximum permissible concentration of m-chloroaniline in water basins. *Gigiena i Sanit. 31*:319-324, 1966.

239. Malov, G.A. Maximum allowable concentration of thiophos in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 4*: 187-197, 1960.

240. Manigold, D.B. and J.A. Schulze. Pesticides in water. *Pesticides Monitoring J. 3(2)*:124-135, 1969.

241. Mann, H. Effect of sublethal doses of detergents on fish. *Muenchner Beitr. Abwasser-, Fisch. -Flussbiol. 9*:131-138, 1967.

242. Mann, J.D. and W.B. Storey. Rapid action of carbamate herbicides upon plant cell nuclei. *Cytologia 31(2)*:203-207, 1966.

243. Marchetti, R. Sublethal effects of surfactants on fish. *Riv. Ital. Sostanze Grasse 45(1)*:27-34, 1968.

244. Marliac, J.P. Toxicity and teratogenic effects of 12 pesticides in the chick embryo. *Federation Proc. 23*:105, 1965.

245. Maslenko, A.A. Hygienic evaluation of dibutylphthalate and dioctylphthalate as water pollutants. *Gigiena i Sanit. 33(6)*:102-103, 1968.

246. Maslennikov, A.S. and G.N. Poryvaeva. Determination of pyrocatechol concentration in effluent from wood-chemical factories. *Gigiena i Sanit. 30(7-9)*:76-80, 1965.

247. Matton, P. and Q.N. LaHam. Effect of the organophosphate dylox on rainbow trout larvae. *J. Fisheries Res. Board Can. 26(8)*:2193-2200, 1969.

248. Marking, L.L. and J.W. Hogan. Toxicity of Bayer 73 to fish. *Invest. Fish Contr. 19*:13, 1967.

249. Mazaev, V.T. Experimental determination of the maximum permissible concentrations of cyanuric acid, monosodium salt of cyanuric acid, simazine, and a 2-hydroxy derivative of simazine in water reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 6:*229-250, 1964.

250. Mazaev, V.T. and I.N. Skachkova. Experimental foundation for permissible urea concentration in bodies of water. *Khim. Faktory Vneshn. Sredy i ikh Gigien. Znachenie, Sb.* pp.100-102, 1965.

251. McGauhey, P.H. *Engineering Management of Water Quality.* McGraw-Hill Book Co., New York, 1968.

252. McKee, J.E. and H.W. Wolf (Editors). *Water Quality Criteria, Second Edition.* The Resources Agency of California State Water Quality Board, Sacramento, California, Pub. No. 3-A, 1963.

253. McLean, S., G.A. Starmer, and J. Thomas. Methaemoglobin formation by aromatic amines. *J. Pharm. Pharmacol. 21:*441-450, 1969.

254. Meleshchenko, K.F. Maximum permissible concentration of phthalic acid (phthalic anhydride) in water bodies. *Gigiena i Sanit. 32:*167-171, 1967.

255. Meleshchenko, K.F. Hygienic background for determining the maximum permissible concentration of trichlorobenzene in the water of reservoirs. *Gigiena i Sanit. 25(3):*13-18, 1960.

256. Meleshchenko, K.F., Ya.I. Kostovetskii, Z.I. Zholdakova, D.P. Romashko, and I.M. Karandakova. Experimental basis for the permissible concentrations of heptyl and nonyl alcohols in bodies of water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*152-165, 1965.

257. Meleshchenko, K.F., D.I. Kostoretskii, Z.I. Zholdakova, D.P. Romashko, and I.M. Karandakova. Data on standardization of heptyl alcohol in water bodies. *Vopr. Gigieny Naselen. Mest. 5:*22-26, 1964.

258. Meleshchenko, K.F., N.V. Mironets, and R.K. Rozhkoveiskaya. Experimental data to substantiate the maximum permissible concentration of phthalic acid (phthalic anhydride) in water reservoirs. *Gigiena i Sanit. 32(8):*12-15, 1967.

259. Metzler, D.F. Water pollution. In: Sax, N.I. *Dangerous Properties of Industrial Materials* pp.78-84. Reinhold Book Corp., New York, 1968.

260. Michael, W.R. Metabolism of linear alkylate sulfonate and alkyl benzene sulfonate in albino rats. *Toxicol. Appl. Pharmacol. 12:*473-485, 1958.

261. Middleton, F.M. and J.J. Lichtenberg. Measurement of organic contaminants in the nation's rivers. *Ind. Eng. Chem. 52:*73A-76A, 1960.

262. Mikheenkov, P.S., A.I. Sidorova, L.P. Zaitseva, and N.N. Trakhtman. Sanitary conditions for the discharge of effluent by streptomycin factories. *Gigiena i Sanit. 30(7-9):*20-24, 1965.

263. Miklashevskii, V.E., V.N Tugarinova, and N.L. Rakhmanina. Toxicity of chloroform administered perorally. *Gigiena i Sanit. 31(8):*320-323, 1966.

264. Miklashevskii, V.E., V.M. Tugarinova, G.P. Yakoveleva, N.P. Alekseeva, and N.L. Rakhmanina. The maximum allowable concentration of trichloroethylene in reservoir water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*308-325, 1962.

265. Mirza, M. An ecological study on the nature of pollution in Tonawanda and Ellicott Creeks on the Niagara River basin and the effects of various chemical variables on the feeding and reproduction rates of *Daphnia Magna. Dissertation Abstracts 29(7):*2683B, 1969.

266. Miura, K., Y. Suzuki, K. Tsuchikura, A. Baba, Y. Hayakawa, T. Hayashi, S. Moriyama, T. Ishiguro, and Y. Yoshida. Alkylbenzenesulphonate in the water of the Tama River. IV. *Yukagaku 17:*635-637, 1968.

267. Morgan, J.J. and R.S. Engelbrecht. Survey of phosphate and ABS concentrations in Illinois streams. *J. Am. Water Works Assoc. 52:*471-482, 1960.

268. Moskalenko, E.G. Toxicological characteristics of nitroanilines (hygienic basis for permissible concentrations of nitroamino compounds in reservoir waters). *Vopr. Kommunal. Gig. 6:*89-94, 1966.

269. Moubry, R.J., J.M. Helm, and G.R. Myrdal. Chlorinated pesticide residues in an aquatic environment located adjacent to a commercial orchard. *Pesticides Monitoring J. 1(4):*27-29, 1968.

270. Mount, D.I., L.W. Vigor, and M.L. Schafer. Endrin: Use of concentration in blood to diagnose acute toxicity to fish. *Science 152(3729):*1388-1390, 1966.

271. Mozhaev, E.A. Experimental basis for permissible concentration of hydroquinone in bodies of water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*194-205, 1965.

272. Mozhaev, E.A. and P.I. Vertebnaya. The maximum allowable concentration of 2,4-D in reservoir water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*158-166, 1962.

273. Murtaugh, J.J. and R.L. Bunch. Acid components of sewage effluents and river water. *J. Water Pollution Control Federation 37(3):*410-415, 1965.

274. Murzakaev, F.G. Hygienic standardization of hexachlorobutadiene and polychlorobutane in water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *7:*29-35. Washington, D.C., U.S. Dept. of Commerce, 1963.

275. Murzakaev, P.G. Experimental basis for the determination of maximal permissible concentrations of hexachlorobutadiene and polychlorobutadienes in natural water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *8:*108-110. Washington, D.C., U.S. Dept. of Commerce, 1964.

276. Nagornyi, S.V. The maximal permissible concentration of sodium methylthiocarbamate (carbathion) and ammonium dimethyldithiocarbamate in water bodies. *Gigiena i Sanit. 32(1-3):*169-175, 1967.

277. Nagornyi, S.V. Determination of standard levels of sodium methyldithiocarbamate (carbathion) and ammonium dimethyldithiocarbamate in water bodies. *Gigiena i Sanit. 32(2):*11-16, 1967.

278. Nagornyi, S.V. Experimental basis for the maximum permissible concentrations of sodium methyldithiocarbamate (carbathion) and ammonium dimethyldithiocarbamate in reservoir waters. *Tr. Leningrad Sanit. Gig. Med. Inst. 81:* 83-90, 1965.

279. Naishtein, S.Ya., E.E. Klebanova, L.A. Tomashevskaya, and A.I. Lur'e. Basic data for revision of the maximum permissible concentration of DDT in bodies of surface water. *Gigiena i Sanit. 33(1-3):*47-52, 1968.

280. Naishtein, S.Ya. Sanitary condition of some Ukranian water reservoirs after use of pesticides in the national economy. *Gigiena i Sanit. 34(3):* 96-97, 1969.

281. Maishtein, S.Ya., F.G. Dyatlovitskaya, E.V. Lisovskaya, Yu.L. Petrov, and R.M. Surkina. The maximum allowable concentration of chlorophenyl chlorobenzenesulfonate in the water of open reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*145-157, 1962.

282. Naishtein, S.Ya., F.G. Dyatlovitskaya, E.V. Lisovskaya, and R.M. Surkina. Maximum permissible concentration of sodium p-chlorobenzenesulfonate in the water of reservoirs. *Gigiena i Sanit. 27(9):*8-12, 1962.

283. Naishtein, S.Ya., F.G. Dyatlovitskaya, and Z.V. Lisovskaya. Experimental basis of permissible concentration of anisole in bodies of water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*143-151, 1965.

284. Maishtein, S.Ya. and E.V. Lisovskaya. Maximum permissible concentration of hexachlorocyclopentadiene in water bodies. *Gigiena i Sanit. 30:*177-182, 1965.

285. Nather, R.E. and B. Warner. Microparticulates: Isolation from water and identification of associated chlorinated pesticides. *Science 166:*897-899, 1969

286. Nazarenko, I.V. Limits of allowable concentrations of butyl and isobutyl alcohols in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*22-30. Washington, D.C., U.S. Dept. of Commerce, 1962.

287. Nazarenko, I.V. Limit of allowable formaldehyde concentration in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*34-40. Washington, D.C., U.S. Dept. of Commerce, 1962.

288. Nemtseva, L.I., T.S. Kishkinova, and A.D. Semenov. Gas-liquid chromatographic determination of low-molecular-weight carboxylic acids in natural water. *Gidrokhim. Mater. 41:*129-141, 1966.

289. Nicholson, H.P. Water contamination by pesticides. *J. Southeast Sect. Am. Water Works Assoc. 32(1):*8-20, 1968.

290. Nicholson, H.P. Insecticide pollution of water resources. *J. Am. Water Works Assoc.* pp.981-986.

291. Nordell, E. *Water Treatment for Industrial and Other Uses.* Reinhold Publ. Corp., New York, 1961.

292. Novogerodova, L.G., V.A. Savelova, and A.N. Sergeev. Experimental basis for the permissible concentration of cyclohexanone in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 8:*101-111, 1967.

293. O'Brien, R.D. *Insecticides - Action and Metabolism.* Academic Press, New York and London, 1967.

294. vonOettingen, W.F. The aliphatic acids and their esters: Toxicity and potential dangers. *Am. Med. Assoc. Arch. Ind. Health 21(1):*40/28-77/65, 1960.

295. Oglesby, R.T. Examination of certain biochemical responses of fish to *in vivo* chlorinated hydrocarbon insecticide exposure in water. Chapel Hill, University of North Carolina, 1963.

296. Ogleznev, G.A. Experimental substantiation of the permissible concentration of alpha-methylstyrene in the water of water bodies. *Gigiena i Sanit. 29 (4):*27-33, 1964.

297. Oliver, G.E. ABS (alkylbenzenesulfonate) in Michigan supplies. *J. Am. Water Works Assoc. 53:*301-302, 1961.

298. Organochlorine pesticides (cont.). *Food Cosmet. Toxicol. 7(5):*533-539, 1969.

299. Organophosphorus round-up: Part II. *Food Cosmet. Toxicol. 7(1):*79-83, 1969.

300. Orlovskii, V.M. Effect of chlorocyclohexane of the organoleptic properties of water and the sanitation conditions of water basins. *Vopr. Gig. Naselen. Mest. 4:*199-203, 1963.

301. Oser, B.L. and M. Oser. 2-(p-tert-butylphenoxy)isopropyl 2-chloroethyl sulfite (Aramite). II. Carcinogenicity. *Toxicol. Appl. Pharmacol. 4:* 70-88, 1962.

302. Ottoboni, A. Effect of DDT on reproduction in the rat. *Toxicol. Appl. Pharmacol. 14(1):*74-81, 1969.

303. Palmova, I.V. and L.V. Galuzova. Maximal allowable concentrations of sodium salt and butilic ester of 2,4-D (herbicide) in water. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *7:*160-162. Washington, D.C., U.S. Dept. of Commerce, 1963.

304. Parke, D.V. (Editor). *The Biochemistry of Foreign Compounds* pp.195-211. Pergamon Press, Oxford, 1966.

305. Patil, K.C., F. Matsumura, and G.M. Boush. Degradation of endrin, aldrin, and DDT by soil microrganisms. *Appl. Microbiol. 19:*879-881, 1970.

306. Patty, F.A. (Editor). *Industrial Hygiene and Toxicology Vol. II.* John Wiley and Sons, New York, 1963.

307. Pavlenko, S.M. Sanitary-toxicological materials for the hygienic basis of the maximum permissible concentration of benzene in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*201-210, 1969.

308. Pavlenko, S.M. and V.A. Savelove. Experimental basis for the determination of maximal allowable concentrations for flotoreagents OPS-M and OPS-B in water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *9:*120-122. Washington, D.C., U.S. Dept. of Commerce, 1966.

309. Percolation and runoff - definedly and definitely, pollution was the insecticide dumped into the Rhine. *J. Am. Water Works Assoc. 61(9):*23-24, 1969.

310. Pesticide residues in fish are staggering..... *Environ. Currents 3(7):*613, 1969.

311. Pesticides turning the corner? *Food Cosmet. Toxicol. 7(2):*175-181, 1969.

312. Pickering, Q.H. Acute toxicity of alkyl benzene sulfonate and linear alkylate sulfonate to the eggs of the fathead minnow, *Pimephales Promelas. Intern. J. Air Water Pollution 10(5):*385-391, 1966.

313. Plugin, V.P. Hygienic standardization of ethylene glycol and diethylene glycol content in the sanitary protection of water reservoirs. *Gigiena i Sanit. 33(3):*16-22, 1968.

314. Plugin, V.P. Hygineic standards for ethylene and diethylene glycols in water supplies. *Gigiena i Sanit. 33(1-3):*333-339, 1968.

315. Polishuk, Z.W., M. Wassermann, D. Wassermann, Y. Groner, S. Lazarovici, and L. Tomatis. Effects of pregnancy on storage of organochlorine insecticides. *Arch. Environ. Health 20(2):*215-217, 1970.

316. Popov, T.A. Maximum permissible concentration of 2,4-dinitrophenol in water basins. *Gigiena i Sanit. 31:*329-335, 1966.

317. Popov, T.A. Substantiation of the maximum permissible concentration of 2,4-dinitrophenol in waters. *Gigieni i Sanit. 31(6):*3-8, 1966.

318. Popper, H., S.S. Sternberg, B.L. Oser, and M. Oser. The carcinogenic effect of aramite in rats - a study of hepatic nodules. *Cancer 13:*1035-1046, 1960.

319. Pozdnyakova, A.G. Hygienic standardization of tetrahydrofuran in water reservoirs. *Gigiena i Sanit. 34(9):*114-115, 1969.

320. Pozdnyakova, A.G. Experimental basis for permissible concentrations of tetrahydrofuran and tetrahydrofuryl alcohol in water. *Tr. Leningrad. Sanit. Gig. Med. Inst. 81:*91-96, 1965.

321. Pozdnyakova, A.G. Data for hygienic substantiation of standard levels of tetrahydrofuryl alcohol in waters. *Gigiena i Sanit. 32(2):*99-101, 1967.

322. Pozdnyakova, A.G. The determination of the maximum permissible content of tetrahydrofuryl alcohol in water bodies. *Gigiena i Sanit. 32(1-3):* 273-276, 1967.

323. Prat, J. and A. Giraud. Toxicity of detergents to man and animals: *The Pollution of Water by Detergents, Part 3.* Organization for Economic Co-operation and Development, Paris, 1964.

324. Prows, B.L. The uptake and residuals of insecticides in the aquatic environment. *Dissert. Abstracts 29(9):*3548-B, 1969.

325. Prusakov, V.M. Hygienic basis for permissible concentration of terephthalic acid and dimethylterephthalate (from the production of Lausan fibers) in reservoir waters. *Vopr. Kommunal. Gig. 6:*94-98, 1966.

326. Public Health Service Drinking Water Standards, 1962. Washington,D.C., U.S. Government Printing Office, PHS No. 956, 1962.

327. Quality of surface waters of the United States, 1964. Washington, D.C., U.S. Government Printing Office, Geological Survey Water Supply Paper No. 1955, 1969.

328. Radionova, L.F. The maximum allowable concentration of monomethylamine in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*326-340, 1962.

329. Radomski, J.L. and W.B. Deichmann. Pesticide levels in a variety of natural and experimental conditions. In: *Chemical Fallout* (Editors: M.W. Miller and G.G. Berg) pp.297-314. Charles C. Thomas, Springfield, Illinois, 1968.

330. Radomski, J.L., W.B. Deichmann, and E.E. Clizer. Pesticide concentrations in the liver, brain and adipose tissue of terminal hospital patients. *Food Cosmet. Toxicol. 6:*209-220, 1968.

331. Rakhmanin, Yu.A. The experimental determination of the maximum permissible concentration of a- and b-naphthols in bodies of water. *Gigiena i Sanit. 30:*345-351, 1965.

332. Rakhmanin, Yu.A., and T.I. Bonashevskaya. Use of histochemical methods of study during a determination of the harmful influence of chemicals on animals. *Prom. Zagryazneniya Vodoemov No. 9:*268-277, 1969.

333. Rakhmanina, N.L. Establishing standards for the phenanthrene and pyrene contents in water bodies. *Gigiena i Sanit. 29(6):*19-23, 1964.

334. Reichel, W.L., E. Cromartie, T.G. Lamont, B.M. Mulhern, and R.M. Prouty. Residues in fish, wildlife and estuaries. Pesticide residue in eagles. *Pesticides Monitoring J. 3(3):*142-144, 1969.

335. Reichenbach-Klinke, H.H. Effect of oil and tar products in water on fish. *Muenchner Beitr. Abwasser, Fisch.-Flussbiol. 9:*200-212, 1967.

336. Reichert, J.K. Carcinogenic substances in water and soil. XXI. Quantitative results on the removal of polycyclic aromatic compounds from drinking water by chlorine dioxide treatment. *Arch. Hyg. Bakteriol. 152(1):*37-44, 1968.

337. Report of the Secretary's commission on pesticides and their relationship to environmental health. Parts I and II. Washington, D.C., U.S. Department of Health, Education, and Welfare, 1969.

338. Reymonds, T.D. Pollutional effects of agricultural insecticides and synthetic detergents. *Water Sewage Works 109:*352-355, 1962.

339. Robens, J.F. Teratologic studies of carbaryl, diazinon, norea, disulfiram, and thiram in small laboratory animals. *Toxicol. Appl. Pharmacol. 15:*152-163, 1969.

340. Roberts, R.S. A review of pesticides used in environmental health activities. *J. Environ. Health 31(6):*1969.

341. Rodopnova, L.F. Experimental substantiation of the permissible monoethanolamine concentration in water bodies. *Gigiena i Sanit. 29(2):*9-19, 1964.

342. Roszkowski, A.P., G.I. Poos, and R.I. Mohybacher. Selective rat toxicant. *Science 144:*412-413, 1964.

343. Rubets, V.I. Permissible concentrations of furan and thiophene in water bodies. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*219-231, 1965.

344. Rubleva, M.N. The maximum allowable concentration of chlorophos in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*129-144, 1962.

345. Rubleva, M.N. Limit of allowable concentration of xylol in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*46-52. Washington, D.C., U.S. Dept. of Commerce, 1962.

346. Rubleva, M.N. Experimental basis for the determination of maximal permissible diethyl maleate concentration in natural water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *8:*125-137. Washington, D.C., U.S. Dept. of Commerce, 1966.

347. Rusakov, N.V. Dichloroanilines, features of biological action and hygienically safe levels in water reservoirs. *Gigiena i Sanit. 33(4):*8-12, 1968.

348. Samoilovich, L.N. and Yu.R. Redkin. Contamination of the Sunzhi River with 3,4-benzpyrene from the petrroleum chemical industry of Grozny. *Gigiena i Sanit. 33(11)*:6-9, 1968.

349. Sapeika, N. *Food Pharmacology* pp.127-133. Charles C. Thomas, Springfield, Illinois, 1969.

350. Savelova, V.A. Maximum allowable concentration for caprolactam in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 4*:156-168, 1960.

351. Savelova, V.A. and N.V. Klimkina. Effect of cyclohexanone oxime on the organoleptic water properties and on the sanitary regulatory regime of natural water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *8*:35-39. Washington, D.C., U.S. Dept. of Commerce, 1966.

352. Savelova, V.A. and V.V. Russkikh. Hygienic norms for nitrocyclohexane in the water of reservoirs. *Gigiena i Sanit. 26(5)*:9-14, 1961.

353. Savelova, V.A., E.S. Bruk, N.V. Klimkina, and V.V. Russkikh. The maximum allowable concentration of cyclohexanol in reservoir water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5*:78-93, 1962.

354. Savelova, V.A. and N.V. Klimkina. The maximum permissible concentration of cyclohexane in well water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 6*:30-45, 1964.

355. Savelova, V.A., E.S. Bruk, and N.V. Klimkina. The maximum permissible concentration of cyclohexene in well water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 6*:46-63, 1964.

356. Sawamura, S. Cytological Studies on the effect of herbicides on plant cells *in vivo*. I. Hormonic herbicides. *Cytologia 29*:86-102, 1964.

357. Schafer, M.L., J.T. Peeler, W.S. Gardner, and J.E. Campbell. Pesticides in drinking water - waters from the Mississippi and Missouri Rivers. *Environ. Sci. Tech. 3(12)*:1261-1269, 1969.

358. Schein, P.S., R.D. David, S. Carter, J. Newman, D.R. Schein, and D.P. Rau. The evaluation of anticancer drugs in dogs and monkeys for the prediction of qualitative toxicity in man. *Clin. Pharmacol. Therap. 11*:3-40, 1970.

359. Sedov, A.V. Experimental basis for determination of maximal permissible tetrachloroalkanes in natural water bodies. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *8*:43-57. Washington, D.C., U.S. Dept. of Commerce, 1966.

360. Selyuzhitskii, G.V. Maximum permissible concentration of trifluorochloropropane in water supplies. *Gigiena i Sanit. 28(12)*:9-14, 1963.

361. Semenov, M.I. Experimental data for standardization of isopropyl amine and diazopropylamine if they are both present in water reservoirs. *Gigiena i Sanit. 34(9):*20-25, 1969.

362. Servizi, J.A., R.W. Gordon, and D.W. Martens. Toxicity of two chlorinated catechols, possible components of kraft pulp mill bleach waste. *Prog. Rep. Int. Pacif. Slm. Fish. Comm. 17:*1-42, 1968.

363. Shabad, L.M. On the distribution and the fate of the carcinogenic hydrocarbon benz(a)pyrene (3,4-benzpyrene) in the soil. *Krebsforsch 70(3):*204-210, 1968.

364. Shartsman, I.E. Data for setting up hygienic standards of perfluoroisobutenylethyl ether in water bodies. *Gigiena i Sanit. 29(5):*17-25, 1964.

365. Shkodich, P.E. Experimental substantiation of the maximum permissible concentration of acetone cyanohydrin in water bodies. *Gigiena i Sanit. 31(6):*8-12, 1966.

366. Shoemaker, T. Impetus for action. *Science News 96:*64, 1969.

367. Shubik, P. Survey of compounds which have been tested for carcinogenic activity - Supplement 1. Washington, D.C., U.S. Government Printing Office, PHS No. 149, 1957.

368. Shubik, P. and J.L. Hartwell. Survey of compounds which have been tested for carcinogenic activity - Supplement 2. Washington, D.C., U.S. Government Printing Office, PHS No. 149, 1969.

369. Shuval, H.I. The public health significance of trace chemical in waste water utilization. *Bull. World Health Organ. 27:*791-800, 1962.

370. Shvartsman, I.E. Maximum permissible concentration of perfluoroisobutylene ethyl ether in water bodies. *Gigiena i Sanit. 29(5):*13-19, 1964.

371. Skachkova, I.N. Hygienic substantiation of the maximum permissible concentration of tetraethyltin in waters. *Gigiena i Sanit. 32(4):*11-17, 1967.

372. Skerfving, S., K. Hansson, and J. Lindsten. Chronosome breakage in humans exposed to methyl mercury through fish consumption. *Arch. Environ. Health 21:*133-139, 1970.

373. Skrapek, K. Toxicity of phenols and their detection in fish. *Ustav. Vedeckotech. Inform. Min. Zemedel., Lesniho Vodniho Hospodarstvi Zivocisna Vyroba 8(8):*499-504, 1963.

374. Smalley, H.E., J.M. Curtis, and F.L. Earl. Teratogenic action of carbaryl in beagle dogs. *Toxicol. Appl. Pharmacol. 13:*392-403, 1968.

375. Smirnova, R.D. and I.M. Stepanona. Experimental basis for the permissible concentration of propylbenzene in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 8:*207-218, 1967.

376. Smirnova, R.D. Experimental determination of permissible concentration of dimethylphenylcarbinol in water bodies. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*206-218, 1965.

377. Smirnova, R.D. and G.P. Zarubin. Experimental basis for the maximum permissible concentration of acetophenone in reservoir waters. *Prom. Zagryazneniya Vodoemov No. 9:*158-170, 1969.

378. Smith, G.E. and B.G. Isom. Investigation of effects of large-scale applications of 2,4-D on aquatic fauna and water quality. *Pesticides Monitoring J. 1(3):*16-21, 1967.

379. Smith, G., B.S. Watson, and F.S. Fischer. The metabolism of (^{14}C) 0,0-diethyl 0-(3,5,5-trichloro-2-pyridyl)phosphorothioate (dursban) in fish. *J. Econ. Entomol. 59(6):*1464-1475, 1966.

380. Smol'skii, A.V. Experimental sanitary toxicological investigation to substantiate the maximum permissible concentration of 1,2-dichlorohexafluoro-1-cyclohexene in water basins. *Gigiena i Sanit. 30(11):*6-12, 1965.

381. Smol'skii, A.V. The experimental determination of the maximum permissible concentration of 1,2-dichlorohexafluorocyclopentene-1 in water bodies. *Gigiena i Sanit. 30(10-12):*177-183, 1965.

382. Smyth, Henry F., Jr., C.S. Weil, J.S. West, and C.P. Carpenter. An exploration of joint toxic action: Twenty-seven industrial chemicals intubated in rats in all possible pairs. *Toxicol. Appl. Pharmacol. 14(2):*340-347, 1969.

383. Solon, J.M., J.L. Lincer, and J.H. Nair. The effect of sublethal concentration of LAS on the acute toxicity of various insecticides to the fathead minnow *(Pimephales Promelas Rafinesque). Water Res. 3:*767-775, 1969.

384. Song, J. and W.E. Harville. Carcinogenicity of aldrin and dieldrin on mouse and rat liver. *Federation Proc. 23(2):*366, 1964.

385. Sparr, B.I., W.B. Appleby, D.M. DeVries, J.V. Osmum, J.M. McBride, and G.L Foster. Insecticide residues in waterways from agricultural use. In: *Organic Pesticides in the Environment* (Editor: R.F. Gould) pp.146-162. Advances in Chemistry Series, ACS 60, 1966.

386. Sprague, J.B. Avoidance reactions of salmonid fish to representative pollutants. *Water Research 2(1):*23-24, 1968.

387. Sprague, J.P. and D.W. McLeese. Toxicity of kraft pulp mill effluent for larval and adult lobsters, and juvenile salmon. *Water Res. 2(11):*753-812, 1968

388. Stavinoha, W.B., J.A. Reiger, and L.C. Ryan. The effects of chronic poisoning by organophosphorus cholinesterase inhibitors on certain brain amines. *Preprints of Papers Presented at 150th Natn'l. Meeting of ACS 5(2):*7, 1965.

389. Steinegger, E. and A. Levan. The effect of chloroform and colchicine of *Allium. Hereditas 33:*515, 1947.

390. Sternberg, S.S., H. Popper, B.L. Oser, and M. Oser. Gallbladder and bile duct adenocarcinomas in dogs after long term feeding of aramite. *Cancer 13(4):*780-789, 1960.

391. Stokinger, H.E. and R.L. Woodward. Toxicologic methods for establishing drinking water standards. *J. Am. Water Works Assoc. 50:*515-529, 1958.

392. Strizhak, E.K. Hygienic significance of methacrylamides in the problem of the sanitary protection of reservoirs. *Materialy. Nauch.-Prakt. Konf. Molodykh Gig. Sanit. Vrachei, 11th* pp.79-82, 1967.

393. Subbotin, V.G. Hygienic assessment of nitromethane and other nitroparaffins in connection with sanitary protection of water reservoirs. *Gigiena i Sanit. 32(9):*9-13, 1967.

394. Sullivan, W.T. and R.D. Swisher. MBAS and LAS surfactants in the Illinois River, 1968. *Environ. Sci. Tech. 3(5):*481-483, 1969.

395. Sullivan, W.T. and R.L. Evans. Major U.S. river reflects surfactant changes. *Environ. Sci. Tech. 2(3):*194-199, 1968.

396. Sullivan, W.T. and R.D. Swisher. Methylene blue active substances and linear alkylate sulfonate surfactants in the Illinois River. *Environ. Sci. Tech. 3(5):*481-483, 1969.

397. Swisher, R.D. Exposure levels and oral toxicity of surfactants. *Arch. Environ. Health 17:*232-246, 1968.

398. Sylvester, R.O. Water Quality Standards. *Water Wastes Eng. 7*, 1970.

399. Takenura, N., T. Akiyama, and C. Nakajima. A survey of the pollution of the Sumida River, especially on the aromatic amines in the water. *Intern. J. Air Water Pollution 9:*665-670, 1968.

400. Talakin, Yu.N. Hygienic standardization of a-naphthoquinone in bodies of water. *Vopr. Gigieny Naselen, Mest, 5:*12-17, 1964.

401. Talakin, Yu.N. Experimental investigation for substantiating the hygienic standards of 1,4-naphthoquinone in water basins. *Gigiena i Sanit. 30(11):*12-17, 1968.

402. Tarjan, R. and T. Kemeny. Multigeneration studies on DDT in mice. *Food Cosmet. Toxicol. 7(3):*215-221; 266-267, 1969.

403. Teasley, J.I. Identification of a cholinesterase-inhibiting compound from an industrial effluent. *Environ. Sci. Tech. 1(5):*411-416, 1967.

404. Terracine, B. Evaluation of the carcinogenicity of the chlorinated hydrocarbons used as pesticides. *Tumori 53(6):*601-618, 1967.

405. Thatcher, T.O. The comparative lethal toxicity of a mixture of hard ABS detergent products to eleven species of fish. *Intern. J. Air Water Pollution 10(9):*585-590, 1966.

406. Tokuomi, H. Minimata disease. *Naika 21:*864-870, 1968.

407. Tracy, H.B., R.A. Lee, C.E. Woelke, and G. Sanbord. Relative toxicities and dispersing evaluations of eleven oil dispersing products. *J. Water Pollution Control Federation 41(12):*2062-2029, 1969.

408. Trakhtman, M.B. Hygienic assessment of the efficiency of polymethacrylate cation flocculents and their permissible residual concentrations in drinking water. *Gigiena i Sanit. 34(9):*15-20, 1969.

409. Trakhtman, N.N. and M.D. Manita. Effect of chlorination of water on pollution by 3,4-benzpyrene. *Gigiena i Sanit. 31(1-3):*316-319, 1966.

410. Trophimovich, E.M. Hygienic investigation of the means of protection of water bodies from contamination with dyes (para- and ortho-aminophenol). *Gigiena i Sanit. 33(8):*10-14, 1968.

411. Tsoneva-Maneva, M.T., F. Kaloyanova, and V. Georgieva. Mutagenic effect of diazinon on human peripheral blood lymphocytes *in vitro*. *Eksp. Med. Morfol. 8(3):*132-136, 1969.

412. Tsubaki, T., et.al. Clinical features of organic mercury poisoning in the Agano River area. *Advan. Neurol. Sci. 13:*85-88, 1969.

413. Tsubaki, T. Organic mercurial poisoning along the River Agano. *Naika 21:* 871-875, 1968.

414. Tugarinova, V.N., V.E. Hikiaskeskii, G.P. Yakovleva, N.L. Raklmanina, and G.B. Kagan. Experimental basis of permissible concentrations of dichloromethane in bodies of water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*41-55, 1965.

415. Tugarinova, V.N., V.E. Miklashevskii, N.P. Alekseeva, and G.P. Yakovleva. The maximum allowable concentration of tetrachloroethane and hexachloroethane in reservoir water. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*285-307, 1962.

416. Usdin, V.R. and M.A. Mitz. Effects of trace amounts of toxic compounds on electric activity of fish. *Preprints of Papers Presented at 150th Natn'l. Meeting of ACS 5(2):*63-66, 1965.

417. vanValin, C.C. Persistence of 2,6-dichlorobenzeonitrile in aquatic environments. In: *Organic Pesticides in the Environment* (Editor: R.F. Gould) pp.271-279. Advances in Chemistry Series, ACS 60, 1966.

418. Varshavskaya, S.P. Comparative sanitary toxicological features of chlorbenzol and dichlorbenzol (ortho- and para-isomers) in sanitary protection of water bodies. *Gigiena i Sanit. 33(10):*15-21, 1968.

433. Vrochinskii, K.K. and A.T. Agalakova. Hygienic assessment of the use of DDT in midges control. *Gigiena i Sanit. 34(3):*14, 1969.

434. Walker, A.I.T., C.H. Neill, D.E. Stevenson, and J. Robinson. The toxicity of dieldrin (HEOD) to Japanese quail. *Toxicol. Appl. Pharmacol. 15(1):* 69-73, 1969.

435. Wallen, J.E., W.C. Greer, and R. Lasater. Stream pollution - toxicity to *Gambusia Affinis* of certain pure chemicals in turbid waters. *Sewage Ind. Wastes 29(6):*695-711, 1957.

436. Warnick, S.L., R.F. Gaufin, and A.R. Gaufin. Concentration and effects of pesticides in aquatic environment. *J. Am. Water Works Assoc. 58(5):*601-608, 1966.

437. Wassermann, M., D. Wassermann, L. Zellermayer, and M. Gon. Pesticides in people. *Pesticides Monitoring J. 1(2):*15-20, 1967

438. Water quality criteria. Report of the National Technical Advisory Committee to the Secretary of the Interior. Washington, D.C., Federal Water Pollution Control Administration, 1968.

439. Weaver, L., C.G. Gunnerson, A.W. Breidendach, and J.J. Lichtenberg. Chlorinated hydrocarbon pesticides in major U.S. river basins. *Public Health Rept. 80(6):*431-493, 1965.

440. Weibel, S.R., R.B. Weidner, J.M. Cohen, and A.G. Christianson. Pesticides and other contaminants in rainfall and runoff. *J. Am. Water Works Assoc. 58(8):*1075-1081, 1966.

441. Weiss, C.M. Stream pollution - response of fish to sub-lethal exposures of organic phosphorus insecticides. *Sewage Ind. Wastes 31(5):*580-593, 1959.

442. Weiss, C.M. Organic pesticides and water pollution. *Public Works 95:*84-87, 1964.

443. Welch, R.M., W. Levin, and A.H. Conney. Estrogenic action of DDT and its analogs. *Toxicol. Appl. Pharmacol. 14(2):*358-367, 1969.

444. Welch, R.M., W. Levin, and A.H. Conney. Effect of chlorinated insecticides on steroid metabolism. In: *Chemical Fallout* pp.390-407. Charles C. Thomas, Springfield, Illinois, 1968.

445. Welsh, E.B. and J.C. Spindler. DDT persistence and its effects on aquatic insects and fish after an aerial application. *J. Water Pollution Control Federation 36:*1285-1292, 1964.

446. Welsh, E.B. and J.F. Thomas. Significance of chemical limits in USPHS drinking water standards. *J. Am. Water Works Assoc. 52:*289-300, 1960.

447. West, I. Pesticides as contaminants. *Arch. Environ. Health 9:*626-633, 1964.

419. Veldre, I. Comparative evaluation of the toxic effect of certain water soluble phenols. *Sb. Dokl. Nauch. Konf. Aktual. Vop Snizheniya Infek. Zabol. Gig. Probl.* pp.200-202, 1968.

420. Veldre, I. and H. Kunamagi. Standardization of raw phenols in natural waters. *Festi. NSV Teaduste Akad. Toimetised. Biol. Seer. 15(1):*122-129.

421. Verrett, M.J., M.K. Mutchler, W.F. Scott, E.F. Reynaldo, and J. McLaughlin. Teratogenic effect of captan and related compounds in the developing chicken embryo. *Ann. N. Y. Acad. Sci. 160:*334-343, 1969.

422. Vertebnaya, P.I. and E.A. Mozhaev. Limits of allowable concentrations of methylethylketone and of cyclohexanone in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*30-34. Washington, D.C., U.S. Dept. of Commerce, 1962.

423. Veselov, V.G. The biological action and the hygienic significance of a picoline and 2,5-lutidine at their contamination of water bodies. *Gigiena i Sanit. 33(18-22):*12, 1968.

424. Vinogradov, P.B. New experimental data for substantiating the maximum permissible concentration of carbon disulfide in water basins. *Gigiena i Sanit. 31(1):*13-17, 1966.

425. Vitvitskaya, B.R. Permissible levels of residual amounts of new cation flocculants in drinking water. *34(5):*13-18, 1969.

426. Vivier, P. and M. Nisbet. Toxicity of some herbicides, insecticides, and industrial wastes. Paper Presented at *Biological Problems in Water Pollution, Third Seminar*, Cincinnati. U.S. Dept. of Health, Education, and Welfare, Environmental Health Series pp.167-169, 1962.

427. Vivoli, G. and C.A. Provvisionato. Quantity of anion detergents in liquid sewage and surface water of the Town of Modena. *Igiene Mod. 59(5-6):*346-362, 1966.

428. Vlieger, M., J. Robinson, M.K. Baldwin, A.N. Crabtree, and M.C. vanDijk. The organochlorine insecticide content of human tissue. *Arch. Environ. Health 17(5):*759-767, 1968.

429. Voloshechenko, O.I. Hygienic and toxicological evaluation of small doses of aldrin as a factor in the pollution of reservoir waters. *Vopr. Kommunal. Gig. 6:*99-103, 1966.

430. Voloshechenko, O.I. Experimental data for determining the hygienic standard level of aldrin in water bodies. *Gigiena i Sanit. 31(4):*13-17, 1966.

431. Voloshechenko, O.I. Data for determining permissible conentration of aldrin in bodies of water. *Vopr. Gigieny Naselen. Mest. 5:*38-42, 1965.

432. Vrochinsii, K.K. and S.S. Grebenyuk. Pesticide contamination of bodies of water and water supply sources. *Gigiena i Sanit. 33(11):*69-72, 1968.

448. Westlake, W.E. and F.A. Gunther. Occurrence and mode of introduction of pesticides in the environment. In: *Organic Pesticides in the Environment* (Editor: R.F. Gould) pp.110-121. Advances in Chemistry Series, ACS 60, 1966.

449. Wilber, C.G. *The Biological Aspects of Water Pollution.* Charles C. Thomas, Springfield, Illinois, 1969.

450. Wiman, R.E. Isolation and identification of certain toxic compounds in a fraction of kraft mill waste. *Dissert. Abstracts 22:*3414-3415, 1962.

451. Wirth, W., G. Hecht, and C. Gloxhuber. *Toxikologie-Fibel* pp.353-355. George Thieme Verlag, Stuttgart, 1967.

452. Woodward, R.L., H.E. Stockinger, and D.L. Birmingham. Health effects of detergents in water. *Arch. Environ. Health 8:*584-588, 1964.

453. Wuu, K.D. and W.F. Grant. Chromosomal abberations induced by pesticides in meiotic cells of barley. *Cytologia 32:*31-41, 1967.

454. Zabezhinskaya, N.A., E.S. Bruk, V.F. Ozerova, and A.I. Gutkovskaya. The limit of allowable acrylonitrile (CH CHCN) concentration in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*78-83. Washington, D.C., U.S. Dept. of Commerce, 1962.

455. Zabezhinskaya, N.A., E.S. Bruk, A.I. Kuper, V.F. Ozerova, and O.I. Vasil'ova. Normalization of the content of aniline, naphthalene, and their derivatives in reservoirs. *Vestn. Tekhn. i Ekon. Inform. Nauchn.-Issled. Inst. 10:*21-22, 1964.

456. Zamislova, S.D. and R.D. Smirnova. Limit of allowable dimethylformamide in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*98-105. Washington, D.C., U.S. Dept. of Commerce, 1962.

457. Zamyslova, S.D. and R.D. Smirnova. Maximum allowable concentration of dimethylformamide in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 4:*177-186, 1960.

458. Zamyslova, S.D., N.M. Stepanova, N.P. Ashmarina, N.V. Meshkov, P.V. Panov, N.N. Pushkina, and A.M. Tambovtseva. Permissible concentrations of ethylmercuric chloride and diethylmercury in water bodies. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 7:*113-128, 1965.

459. Zeller, Howard D. Stream standards and water supplies. *J. Southeastern Section Am. Water Works Assoc. 32(1):*28-36, 1968.

460. Zhakov, Yu.A. Limit of allowable ursol and quinone concentrations in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*134-146. Washington, D.C., U.S. Dept. of Commerce, 1962.

461. Zhakov, Yu.A. Maximum allowable concentration of ursol (p-phenylenediamine), Bandrowski's base, and quinone in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 4:*230-246, 1960.

462. Ziabarova, S.Ia. and M.N. Kuklina. Hygienic evaluation of diazobutyl amine concerning sanitary protection of water reservoirs. *Gigiena i Sanit. 34(9):*115-117, 1969.

463. Zubritskii, K.V. The maximum allowable concentration of ethylbenzene in reservoirs. *Sanit. Okhrana Vodoemov ot Zagryazneniya Prom. Stochnymi Vodami No. 5:*62-77, 1962.

464. Zyabbarova, S.A. Limit of allowable pyridine concentration in water basins. In: *U.S.S.R. Literature on Water Supply and Pollution Control* (Editor: B.S. Levine) *3:*72-78. Washington, D.C., Dept. of Commerce, 1962.

465. Zyabbarova, S.A. Discharge into water bodies of sewage containing monoethyl ether of ethylene glycol. *Gigiena i Sanit. 31(11):*3-5, 1966.

466. Zyabbarova, S.A. Cellosolve as a factor in water pollution. *Tr. Leningrad. Sanit. Gig. Med. Inst. 81:*70-74, 1965.

467. Zyabbarova, S.A., M.N. Kuklina, and E.V. Teplyakova. Hygienic and toxicological characteristics of quaternary ammonium chloride. *Gigiena i Sanit. 33(4-5):*155-159, 1968.

468. Zyabbarova, S.A., and E.V. Teplyakova. Data for establishing the permissible concentrations of chlorine chloride in bodies of water. *Tr. Leningrad. Sanit. Gig. Med. Inst. 81:*75-78, 1965.

469. Zyabbarova, S.A. and E.V. Teplyakova. Health problems of tributyl phosphate. *Gigiena i Sanit. 33(7):*100-102, 1968.

ADDITIONAL REFERENCES

1. Alabaster, S. J. Testing the toxicity of effluents to fish. *Chem. Ind. 24:*759-64, 1970.

2. Alderson, T. H. Mechanism of formaldehyde-induced mutagenesis. The monohydroxylmethylation reaction of formaldehyde with adenylic acid as the necessary and sufficient condition for the mediation of the mutagenic activity of formaldehyde. *Mutat. Res. 1:*77-85, 1964.

3. Alderson, T. H. Mechanisms of mutagenesis induced by formaldehyde. The essential role of the 6-amino group of adenylic acid in the mediation of the mutagenic activity of formaldehyde. *Nature 191:* 251-253, 1961.

4. Amer, S. M. Cytological effects of pesticides. I. Mitotic effects of N-methyl-1-naphthyl carbamate "Sevin." *Cytologia (Tokyo) 30:* 175-181, 1965.

5. Avar, P. and G. Czegledi-Janko. Occuptational exposure to aldrin: clinical and laboratory findings. *Brit. J. Ind. Med. 27:*279-82, 1970.

6. Bailey, G. W. Entry of biocides into watercources. In: *Proceedings of the Symposium on Agricultural Waste Waters, Report No. 10,* 94-103. University of California, Water Resources Center, 1966.

7. Bars, E. A. and S. S. Kogan. Organic substances entering water from petroleum and petroleum products. *Gidrokhim. Mater. 50:*121-6, 1969.

8. Benson, W. W., T. A. Marr and J. Gabica. An apparent case of pesticide poisoning. *Public Health Rept. 85:*600-602, 1970.

9. Biggar, J. W. Factors affecting the appearance of pesticide in drainage water. In: *Proceedings of the Symposium on Agricultural Waste Waters, Report No. 10,* 104-11. University of California, Water Resources Center, 1966.

10. Blackwell-Smith, R., J. K. Finnegan, P. S. Larson, P. F. Sahyoun, M. L. Dreyfuss and H. B. Haab. Toxicologic studies on zinc and disodium ethylene bisdithiocarbamates. *J. Pharm. Exp. Therap. 109:*159-66, 1953.

11. Bloom, S. C. and S. E. Degler. Pesticides and pollution. *BNA's Environmental Management Series,* 1969.

12. Boyd, E. M. and C. J. Krijnen. Toxicity of captan and protein-deficient diets. *J. Clin. Pharm. 8:*1225-234, 1968.

13. Breidenbach, A. W. Pesticide residues in air and water. *Arch. Environ. Health 10:*827-830, 1965.

14. Bulay, O. M. and L. W. Wattenberg. Effects of administration of polycyclic hydrocarbon carcinogens during pregnancy on the progeny. University of Minnesota Medical School, dissertation #53455, Minneapolis, Minnesota.

15. Butler, P. A. Monitoring pesticide pollution. *BioScience 19(29):* 889-91, 1969.

16. Buzzell, J. C., Jr., R. H. F. Young and D. W. Ryckman. Behavior of organic chemicals in the aquatic environment. Part II-Behavior in dilute systems. Manufacturing Chemists Association, Washington, D. C., 1968.

17. Cairns, J. and A. Scheier. A comparison of the toxicity of some common industrial waste components tested individually and combined. *Progve. Fish Cult. 30:*3-8, 1968.

18. Cairns, J., Jr., A. Scheier and N. E. Hess. The effects of alkyl benzene sulfonate on aquatic organisms. *Ind. Water Wastes 9(1):* 22-8, 1964.

19. Carpenter, C. P., C. S. Weil and H. F. Smyth. Toxicity of an imidazoline (or glyoxalidine) fungicide. *Am. Med. Assoc. Arch. Ind. Health 4:*494-503, 1951.

20. Cope, O. B. Some responses of freshwater fish to herbicides. *Proc. Southern Weed Conf. 18:*439-45, 1965.

21. Cope, O. B. Contamination of the freshwater ecosystem by pesticides. *J. Appl. Ecol. (Brit.) 3:*33, 1966.

22. Ruiz-Cruz, J. Pollution of water by synthetic detergents. II. Effects and problems resulting from the use of these substances. *Inform. Grasas Aueites 7(2):*48-59, 1969.

23. Curley, A. and R. Kimbrough. Chlorinated hydrocarbon insecticides in plasma and milk of pregnant lactating women. *Arch. Environ. Health 18:*156-164. 1969.

24. Curtis, E. J. C. and D. W. Harrington. Effects of organic wastes on rivers. *Process Biochem. 5:*44-6, 1970.

25. Cytological and genetic effects of the defoliant endothall. *J. Heredity 47:*151-155, 1956.

26. Czegledi-Janko, G. and P. Avar. Occupational exposure to lindane: clinical and laboratory findings. *Brit. J. Ind. Med. 27:*283-6, 1970.

27. Dittmer, D. S. (ed.). *Handbook of Toxicology, Vol. III Insecticides.* Philadelphia and London; W. B. Saunders Company, 1959.

28. Dittmer, D. S. (ed.). *Handbook of Toxicology, Vol. V Fungicides.* Philadelphia and London; W. B. Saunders Company, 1959.

29. DuBois, K. P. Insecticides, rodenticides, herbicides: household hazards. *Postgrad. Med. 24:*278-288, 1958.

30. Dugan, P. R. Influence of chronic exposure to anionic detergents on subsequent toxicity of dieldrin and dichlorodiphenyltrichloromethane (DDT) to goldfish. *Preprints of papers presented at 150th National Meeting of ACS 5(2):*67-70, 1965.

31. Dugan, P. R. Influence of chronic exposure to anionic detergents on toxicity of pesticides to goldfish. *J. Water Pollution Control Federation 39:*63-71, 1967.

32. Enderson, J. H. and D. D. Berger. Pesticides: eggshell thinning and lowered production of young in prairie falcons. *BioScience 20(8):*355-56, 1970.

33. Edmundson, W. F., J. E. Davies and M. Cranmer. DDT and DDE in blood and DDA in urine of men exposed to 3 percent DDT aerosol. *Public Health Rept. 85:*457-63, 1970.

34. Finnegan, J. K., H. B. Haag and P. S. Larson. Tissue distribution and elimination of DDD and DDT following oral administration to dogs and rats. *Proc. Soc. Exp. Biol. Med. 72:*357-60, 1949.

35. Fitzhugh, O. G., A. A. Nelson and J. P. Frawley. The chronic toxicities of technical grade benzene hexachloride and its alpha, beta, and gamma isomers. *J. Pharm. Exp. Thera. 100:*59-66, 1950.

36. Fitzhugh, O. G., A. A. Nelson and M. L. Quaife. Chronic oral toxicity of aldrin and dieldrin in rats and dogs. *Food Cosmet. Toxicol. 2:*551-62, 1964.

37. Food and Agriculture Organization of the United Nations World Health Organization. Evaluation of some pesticide residues in food. *WHO Tech. Rept. Ser. 370:*7-16, 1967.

38. Fujita, T. and M. Nakajima. Correlation between physiological activity and physiochemical property of substituted phenols. *Residue Rev. 25:*319-26, 1969.

39. Ghadiri, M. Malformations and toxic effects of two organic phosphates and a carbamate on the chicken embryo and the adult chicken. *Dissertation Abstracts 29:*1314-B, 1968.

40. Gofmekler, V. A., N. N. Pushkina and G. N. Klevtsova. Some biochemical aspects of the embryotropic effect of benzene and formaldehyde. *Gigiena i Sanit. 33:*113-5, 1968.

41. Goncharuk, G. A. Effect of mercuran and mercurhexane on the offspring of albino rats. *Gigiena i Sanit. 33:*427-9, 1968.

42. Hansen, W. H., K. J. Davis and O. G. Fitzhugh. Chronic toxicity of cube. *Toxicol. Appl. Pharmacol. 7:*535-42, 1965.

43. Hayes, W. J., Jr. Pesticides and human toxicity. In: *Biological Effects of Pesticides in Mammalian Systems. Annals of the N. Y. Academy of Sciences 160 (Art. 1):*40-54, June 23, 1969.

44. Heinisch, E. Possibility of contaminating waters with pesticides. *Fortschr. Wasserchemi Ihrer Grenzgeb. 11:*9-42, 1969.

45. Hennigan, R. D. Water pollution. *BioScience 19(11):*976-78, 1969.

46. Heuper, W. C. Cancer hazards from natural and artificial water-pollutants. In: *Proceedings Conference on Physiological Aspects of Water Quality,* 181-193. Washington D. C., 1960.

47. Hodge, H. C., E. A. Maynard and H. J. Blanchet. Chronic oral toxicity tests of methoxychlor (2,2-di-(p-Methoxyphenyl)-1,1,1-trichloroethane) in rats and dogs. *J. Pharm. Exp. Thera. 104:*60-66, 1952.

48. Hrutfiord, B. F. Organic material in pulp and paper mill effluent. *College of Forest Resources, Dissertation No. 98105.* University of Washington, Seattle, Washington.

49. Hunt, E. G. The impact on fish and wildlife of pesticides in agricultural waste waters. In: *Proceedings of the Symposium on Agricultural Waste Waters, Report No. 10,* 170-8. University of California, Water Resources Center, 1966.

50. Hunter, C. G. and J. Robinson. Aldrin, dieldrin and man. *Food and Cosmet. Toxicol. 6:*253-69, 1968.

51. Hypersensitivity to mercury. *Science 169:*811, 1970.

52. Insecticides in Lake Michigan. *Lake Michigan Enforcement Conference, Nov. 1968, Report by Pesticides Committee.* U. S. Department of the Interior, Federal Pollution Control Administration, Great Lakes Region, Chicago, Illinois.

53. Iverson, L. C. K. Monitoring pesticide content in water in selected areas of the United States. In: *Agriculture and the Quality of our Environment,* p.157-62. AAAS Publ. 85, 1967.

54. Jager, K. W., D. V. Roberts and A. Wilson. Neuromuscular function in pesticide workers. *Brit. J. Ind. Med. 27:*273-78, 1970.

55. Kampmeier, C. and H. B. Haag. Toxicological considerations in use of dithiocarbamates. *Agriculture Chemicals 27:*49-51, 1954.

56. Kanygina, A. V. and I. L. Rodziller. Effect of chemical industry waste water on open water bodies. *Vodosnabzhenie i Sanit. Tek. No. 4*:25-28, 1957.

57. Kay, K. Effect of organic pesticides on enzyme systems in mammals. *Preprints of papers presented at 150th National Meeting of ACS 5(2)*:5, 1965.

58. Keane, W. T. and M. R. Zavon. The total body burden of dieldrin. *Bull. Environ. Contam. Toxicol. 4*:1-16, 1969.

59. Kimbrough, R., T. B. Gaines, and J. D. Sherman. Nutritional factors, longterm DDT intake and chloroleukemia in rats. *J. Nat. Cancer Inst. 33*:215-25, 1964.

60. Konar, S. K. Toxicity of heptachlor to aquatic life. *J. Water Pollution Control Federation 42(pt. 2)*:299-303, 1970.

61. Krishnaswami, S. K. and W. M. Walkinshaw. A review of Canadian drinking water standards and objectives. *Can. J. Public Health 60*:198-202, 1969.

62. Kruse, H. Carcinogens in drinking water supply. *Gas-Wasserfach 106 (12)*:318-25, 1965.

63. Leuschner, F., R. Poche, and C. Gloxhuber. Toxicological examination of a dish-washing agent. *Fette, Seifen, Anstrichmittel 71(7)*:570-80, 1969.

64. Lichtenstein, E. P. Pesticide residues in soils, water, and crops. In: *Biological Effects of Pesticides in Mammalian Systems. Annals of the N. Y. Acad. Sci. 160, Art. 1*:155-61, June 23, 1969.

65. Liebmann, H. and A. Stammer. Toxicology of waste waters. III. Organic poisons. In: *Liebmann, H. (ed.), Handbuch der Frischwasser-und Abwasser-Biologie*; 827-74. Munchen, R. Oldenbourg, 1960.

66. Linn, J. D. and R. L. Standey. TDE residues in Clear Lake animals. *Calif. Fish Game 55(3)*:164-78, 1969.

67. Mann, J. D. and W. B. Storey. Rapid action of carbamate herbicides upon plant cell nuclei. *Cytologia 31*:203-207, 1966.

68. Maximum allowable concentrations of mercury compounds. Report of an International Committee. *Arch. Environ. Health 19(6)*:891-905, 1969.

69. Miller, M. W. and G. Berb (ed.). *Chemical Fallout. Current Research on Persistent Pesticides.* Springfield, Illinois, Charles C. Thomas Inc., 1970.

70. Moats, S. A. and W. A. Moats. Toward safer use of pesticides. *BioScience 20(4)*:459-63, 1970.

86. Robson, T. O. Persistence of 2,4-D in natural surface waters in Britain. *Proceedings Brit. Weed Control Conf. (8th) 2:*594-7, 1966.

87. Roger, J. C., D. G. Upshall and J. E. Casida. Structure-activity and metabolism studies on organophosphate teratogens and their alleviating agents in developing hen eggs with special emphasis on bidrin. *Biochem. Pharmacol. 18:*373-92, 1969.

88. Rose, J. (ed.). *Technological Injury,* New York: Gordon and Breach, 1969.

89. Ryckman, D. W., A. V. S. Rao and J. C. Buzzell, Jr. Behavior of organic chemicals in the aquatic environment. A literature critique. Manufacturing Chemists Association, Washington, D. C., 1966.

90. Saffrotti, U., P. Shubik and D. L. Opdylre. Carcinogenic tests on alkylbenzenes and alkylbenzene sulfonates. *Toxicol. Appl. Pharmacol. 4:*763-769, 1962.

91. Sanders, H. O. Toxicities of some herbicides to six species of freshwater crustaceans. *J. Water Pollution Control Federation 42:* 1544-1550, 1970.

92. Sanderson, D. M. and E. F. Edson. Toxicological properties of the organophosphorus insecticide dimethoate. *Brit. J. Ind. Med. 21:* 52-64, 1964.

93. Schafer, M. L. Distribution of pesticide residues in the human body. *Preprints of papers presented at 150th National Meeting of ACS 5(2): 8:*1965.

94. Schenk, C. F. Pesticides and water quality. *Ontario Soil Crop Impr. Ass. Addresses Proc., 26th Annual Meeting* 85-9, 1965.

95. Smith, J. W. and S. G. Grigoropoulos. Toxic effects of trace organics on fish. *J. Am. Water Works Assoc. 62:*499-506, 1970.

96. Sparr, B. I. Residues in water ways from farm use of pesticides. In: *Proceedings of the Symposium on Agricultural Waste Waters, Report No. 10,* 83-89. University of California, Water Resources Center, 1966.

97. Sprague, J. B. Measurement of pollutant toxicity to fish. II. Utilizing and applying bioassay results. *Water Res. 4:*3-31, 1970.

98. Sreenivasan, A. and R. S. Raj. Toxicity of malathion and parathion to fish. *Pesticide Symp. 1964* 316-8, 1968.

99. Tarjan, R. and T. Kemeny. Multigeneration studies on DDT in mice. *Food Cosmet. Toxicol. 7:*215-222, 1969.

100. Tarrant, R. F. Pesticides in forest waters;symptom of a growing problem. *Soc. Am. Forest Proc. 1966:*159-73, 1967.

101. Tokunaga, S. Metabolism of pentachlorophenol in fish and mammals. I. Distribution of pentachlorophenol in fish. *Kagaku Keisatsu Kenkyusho Hokoku 21(2):*126-30, 1968.

102. Treon, J. F. and E. P. Cleveland. Toxicity of certain chlorinated hydrocarbon insecticides for laboratory animals, with special reference to aldrin and dieldrin. *J. Agr. and Food Chem. 3:*402-408, 1955.

103. Upholt, W. M. and H. F. Kraybill. Ecological effects of pesticides. In: *Biological Effects of Pesticides in Mamalian Systems, Annals of the N. Y. Academy of Sciences 160 (Art. 1):*55-60, June 23, 1969.

104. Walpole, A. L., D. C. Roberts, F. L. Rose, J. A. Hendry and R. F. Homer. Cytotoxic agents: IV, the carcinogenic actions of some monofunctional ethyleneimine derivatives. *Brit. J. Pharmacol. 9:*306-323, 1954.

105. Weaver, P. J. Phospates in surface waters and detergents. *J. Water Pollution Control Federation 41(9):*1647-53, 1969.

106. Westlake, W. E. Pesticides as contaminants of agricultural waste waters. In: *Proceedings of the Symposium on Agricultural Waste Waters, Report No. 10,* 90-93. University of California, Water Resources Center, 1966.

107. Wuu, K. D. and W. F. Grant. Chromosomal aberations induced by pesticides in meiotic cells of barley. *Cytologia 32:*31-41, 1967.

108. Zavon, M. R. Ineractions. *BioScience 19(10):*892-95, 1969.

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